

BOLT ACTION RIFLES

EXPANDED
3RD EDITION

By Frank de Haas

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DESIGN SINCE
THE MAUSER
OF 1871 ■

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of 124 turnbolt actions
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strengths and weaknesses;
dimensional specifications.

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Frank de Haas

1916-1994



FRANK DE HAAS died December 19, 1994, just a few days after finishing this book. That final illness was sudden, and he died where he was born, in Orange City, Iowa.

During his writing career, from 1943 through 1994, de Haas wrote nine books about guns and hundreds of articles in a wide range of publications. He wrote much of this immense output from a gunsmithing point of view.

De Haas never considered himself a professional gunsmith. For a time he took in work, his shop in a corner of a plumber's shop, later in his basement at home. Whether for himself or not, with a Craftsman lathe and drill press, he remodeled, restocked, rechambered and rebarreled all kinds of guns.

For the last thirty years or so, de Haas gunsmithed for his readers, doing jobs he could write about. He was good enough to design single shot rifle actions and did so, and some of those are shooting today. Indeed, he was called "Mr. Single Shot" in some circles for his abiding interest in that classic sort of American rifle.

Frank de Haas was a Life Member of the National Rifle Association, a lifelong church-goer and a family man. He is survived by his wife, Katie, by a daughter and a son and five grandchildren.

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BOLT ACTION RIFLES

**EXPANDED
3RD EDITION**

by Frank de Haas

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About Our Covers

This book is about the nuts and bolts of bolt-action rifles, so we thought our readers would like to see the inner workings of one of the best-known rifles ever made, the Winchester Model 70. It's not often we get to look inside a modern rifle to see how the various parts interact and, failing X-ray vision, the best way to do this is with a cutaway gun.

The cutaway Model 70 XTR Sporter on our covers shows the working relationship of all major parts – in fact, the bolt still can be fully manipulated, the trigger pulled, floorplate released and the magazine loaded. As can be seen, this gun uses the post-'64 extractor, which has now been replaced by the pre-'64-type extractor, giving controlled feeding. Shown below is an uncut version of the same gun, so you can see just how much metal and wood have been removed to create the working cutaway. Winchester's Model 70 has gone through many changes since its introduction in the 1930s, some good, some not so good. For the full story of the evolution of this action, see pages 475-497 of this edition.

Today's Winchester Model 70 is one of the best, most enduring designs ever – truly the "rifeman's rifle".

Photo by John Hanusin.

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Ludwig E. Olson deserves a special thank you for writing that wonderful book, *Mausier Bolt Rifles*, for without this book the Mauser chapters in my book would have been the poorer.

In preparing the third and enlarged edition of this book, I also want to thank the following individuals and firms for the whole-hearted assistance given me:

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Contents

Introduction	6
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Part I: Military Rifles & Actions

Enfield Rifles	9
French Military Turnbolts	18
German Model 88 Commission Rifle	32
German Model 98/40	39
Greek Model 1903 Mannlicher-Schoenauer	44
Italian Carcano Rifles	53
Japanese Arisaka Rifles	59
Krag-Jorgensen: U.S., Danish and Norwegian	77
Lee-Enfield Rifles	86
Mausers Miscellany	97
Mausers Model 98	100
Mausers Models 71 & 71/84	110
Mausers Models 92, 93, 94, 95 & 96	117
Mausers Smokeless Powder Actions Models 88, 89, 90 & 91	129
Mausers—Siamese Mauser	136
Russian Mosin-Nagant Rifles	140
Springfield Models 1903, 1903A3 & 1903A4	147

Part II: Commercial Rifles & Actions

Anschutz Classic Centerfire Rifle	161
Blank Custom Rifle	166
Blaser Model R84 Takedown Rifle	169
Brno (Czech) Sporting Rifles	174
Browning A-Bolt II BOSS Rifle	182
Browning BBR Rifle	188
BSA Royal, Majestic, Monarch, Herter's U9 Rifles	194
Champion Firearms, Inc.	207
Colt Sauer Rifle	212
Cooper Model 38 Centerfire Rifle	220
Dakota Arms Model 76	225
FN Actions & Rifles	230
French Model 36 MAS Sporter	237
Golden Eagle Model 7000	240
Herter's Plinker Rifle	244
Husqvarna and Smith & Wesson Rifles	246
Husqvarna Model 8000	252
Interarms Mark X Mauser	256
Interarms Mini-Mark X	261
Ithaca Model LSA-55	267

Contents

Kimber Model 82 Hornet	272
Kimber Model 84	280
Kleinguenther Improved K15 Insta-Fire	282
Krico Model 300 Hornet	287
Mathieu Left-Hand Rifle	292
Mausers Two-Shot Shotgun	296
Mausers Model 98 Sporters	300
Mausers, Miscellaneous Commercial	305
Mossberg Model 800	312
Newton Original Tumbolt	317
Omega III	323
Remington Model 788	328
Remington Model Seven Carbine & Model 700 Mountain Rifle	334
Remington Models 30, 30S and 720	342
Remington Models 721, 722, 725, 700, 600, 660 and 40-X	345
Ruger Original Model 77	358
Ruger Model 77 Mark II	367
Ruger Model 77/22 Hornet	375
Sako Rifles	381
Savage Model 1920	396
Savage Model 23B, C & D	402
Savage Models 40 Sporter & 45 Super Sporter	409
Savage Model 110 Series	413
Savage-Stevens Model 340	424
Schultz & Larsen Rifles	428
Smith & Wesson and Mossberg Model 1500	434
Sportco Model 44 Target Rifle	440
Steyr-Mannlicher Model SL Rifle	444
Texas Magnum Rifle	450
Tradewinds Series 600 Action	454
Weatherby Mark V Rifle	459
Weatherby Vanguard Rifle	465
Winchester Model 43 Rifle	470
Winchester Model 70 Classic	475
Winchester Model 70 Post-'64	480
Winchester Models 54 & 70	487

Part III: Reference

Barrel Shank Drawings	501
Appendix—Magazine Guard Screw Sizes & Threads	511
Bibliography A— <i>American Rifleman</i> 1933-1995	512
Bibliography B— <i>Gun Digest</i> 1944-1996	521
Index	523

Introduction

"Whether rifles are new or obsolete, plentiful or rare, low cost or expensive, all are different and all are interesting."

THAT WAS FRANK de Haas talking. There just weren't any rifles he scorned, in contrast to many, maybe most, of his contemporaries. In decades of gun writing, de Haas took them as they came and enjoyed them all. And so, therefore, did all his thousands and thousands of readers.

And there were thousands of readers, even without those who read the magazines or bought the books. There was a time—a long time—when de Haas was one of the NRA's stable of experts who wrote to members on their technical problems.

That was a pretty heavy-duty group. NRA paid—early on—\$1.25 per letter, and furnished envelopes and postage, and demanded a carbon. Frank de Haas did that for years, so thousands of his readers read him straight from the source.

There are writers who are engineers and writers who are elitists. Some go for sensation; others for the folksy touch; some are "just one of the boys." Frank de Haas was the gunsmith neighbor who didn't mind talking.

He had a whole collection of bolt actions—just the actions, not the rifles. Very sensible. And by 1971, his studies brought forth the first edition of this book. And thirteen years later, a revised edition. And here we are again.

Anything interesting in rifles was grist to the de Haas mill. Almost any of us might have done a few hundred words on a French MAS sporter if we happened on one. Only a de Haas would have told us all that the U.S. Krag-Jorgensen military rifle might fairly easily be rebarreled to 444 Marlin, pointing out that a lot of Krags were showing up as cheap, poorly worked-over, sporting conversions—mostly and ideal 444s-to-be.

It might have been all that one-on-one contact with NRA members that kept de Haas focused on the mechanical, and on the tinkering. Certainly his books—this book—reveal he generally tried something before he talked about it. Typically, he not only described the actions and their functioning in great detail, but also describes what it might take to improve a given rifle—almost any given rifle.

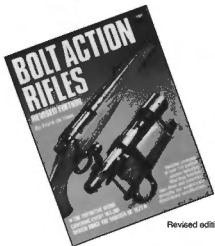
It was generally pretty good advice, which paid little attention to shooter attitudes. If a slightly crude trigger was good enough, he said so, as with the Remington 788. If something offended the eye, he said change it, as with the lock nut on the Savage 110 barrel.

So it is with this book—no pretension, no backing and filling, no cutting corners. You read this one, you get everything Frank de Haas wanted to say about every one of the rifles. That's pretty good. So was he.

Ken Warner



First edition



Revised edition

Part I
Military
Rifles & Actions

Military Rifles & Actions

Enfield Rifles	9-17
French Military Tumbolts	18-31
German Model 88	
Commission Rifle	32-38
German Model 98/40	39-43
Greek Model 1903	
Mannlicher-Schoenauer	44-52
Italian Carcano Rifles	53-58
Japanese Arisaka Rifles	59-76
Krag-Jorgensen: U.S.,	
Danish and Norwegian	77-85
Lee-Enfield Rifles	86-96
Mauser Miscellany	97-99
Mauser Model 98	100-109
Mauser Models 71 & 71/84	110-116
Mauser Models 92, 93, 94,	
95 & 96	117-128
Mauser Smokeless Powder Actions	
Models 88, 89, 90 & 91	129-135
Mauser—Siamase Mauser	136-139
Russian Mosin-Nagant Rifles	140-146
Springfield Models 1903,	
1903A3 & 1903A4	147-158



Enfield Rifles

Part I 1917 U.S. Enfield

PROFESSIONAL AND AMATEUR gunsmiths have long been familiar with the Model 1917 Enfield action. It has been used widely in recent years to build custom sporting rifles in both standard 30-06 head-sized rimless and belted magnum cartridges. A large and rugged action "as issued," it is also a homely one. Fortunately, however, it is receptive to much alteration and remodeling.

When the United States entered WWI in 1917, it was short of rifles, and immediate plans had to be made to acquire more. In 1913 British Ordnance developed a new Mauser-type turnbolt action for a 276-caliber rimless cartridge. When England became involved in the war, development work on this cartridge was dropped and the action was modified to handle their standard military round, the 303 British rimmed cartridge. Rather than begin production of this rifle (which was designated the Pattern 1914) in 1914, the British gave contracts to three firms in the United States to make them.

These firms were Winchester, Remington and Eddystone. When the British found that they could produce enough of the older Lee-Enfield rifles, they canceled the contracts in 1916. Thus, at the time the United States entered the war there were three large plants tooled up to make a military rifle. With this in mind, someone (it is believed that Remington initiated this conversion) got busy and redesigned the Pattern 1914 action to handle the 30-06 cartridge. In 1917 new contracts were awarded to these three firms to make the new rifle, officially called the "U.S. Rifle, Cal. .30, Model 1917."

Production Figures

Production of this rifle ended in these plants in November, 1918. According to reliable sources, Winchester produced 545,511, Remington about 545,541 and about 1,181,908 were made at Eddystone, all at an average cost to the government of \$26 each. Of the total, perhaps some 80,000 were unassembled rifles to be used for spare parts. These figures reveal that Eddystone made more than Remington and Winchester combined, which accounts for the predominance of the Eddystone.

Markings and Serial Numbers

The model designation, manufacturer's name and serial number were stamped on the receiver ring in four lines as follows:

U.S.
MODEL OF 1917
EDDYSTONE (Or Winchester or Remington)
(serial number)

The receiver is the only part serial numbered. Winchester M1917 Enfields were serial numbered from number 1 on, and it is believed this practice was also followed by Remington and Eddystone.

Action Construction

For a military action, the 1917 Enfield was exceptionally well made and finished. Few machine marks can be found under the Park-erized finish. The bolt is made unusually smooth and even, the result a slick-operating action.

The receiver and bolt are machined from 3½ percent nickel steel forgings, a very strong alloy similar in composition to the nickel steel used in many 1903 Springfield actions.

Most of the receiver bottom is flat. The recoil lug, located at the front of the flat bottom, is about 1¼" wide and ½" deep. The

extreme front end of the receiver is round while the rest of the receiver ring is flat on the bottom and round on top. On the right side of the receiver ring there is a raised rectangular portion to strengthen the receiver over the inside mill cut for the extractor. The ½" gas-escape vent hole, in the center of this raised portion, is in line with the extractor hook and extractor cut in the barrel. The barrel threads are square. The barrel breech is coned, with part of this funnel edge milled out for the extractor. The front of the bolt breeches nearly against the barrel when the action is closed.

The rear part of the receiver, normally called the bridge, is made to house and protect the folding aperture rear sight. Integral "ears" or "wings" project upward on either side to protect the folding sight components. Although without windage adjustment, this sight was considered one of the best military sights designed up to that time.

The front of the bridge has grooves, these forming a guide for loading the magazine via Springfield five-shot stripper clips. The bolt has two large front locking lugs. The right (bottom) lug is solid; the left (top) lug is divided by a narrow slit for the ejector to pass through when the action is opened. The bolt face is partially recessed, surrounding about two-thirds of the cartridge rim. When the bolt is closed, the open, unrecessed segment is toward the left, exactly opposite the gas vent.

(Pictured above) U.S. Model 1917 Enfield rifle, caliber 30-06. This rifle has a 26" barrel, is 46.3" overall, and weighs about 9.5 pounds. As originally made, the M1917 barrels had five grooves and a left-hand rifling twist of 1:10". Many 1917s were later fitted with two- and four-groove barrels.

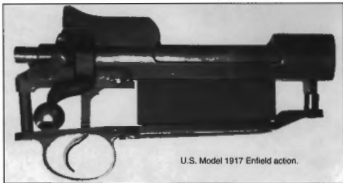
PART I: Military Rifles & Actions

The bolt handle has a double bend backward, which positions the hollowed grasping ball about $\frac{3}{4}$ " back of the base of the bolt. The bolt handle, of the "low" type, need never be altered if the action is to be fitted with a low-mounted scope. When the bolt is closed the heavy base of the bolt handle fits into a deep notch in the receiver, acting as a safety lug. The rear of the bolt handle base does not touch the receiver (which is as it should be), making it a safety lug rather than a third locking lug.

The upper or left end of the bolt handle base is tapered to the rear. When the bolt is opened, it contacts a matching surface inside the receiver bridge, providing positive primary extraction camming power.

The extractor is a long Mauser type attached to the bolt body by a collar in a recess in the body. A narrow lip in the front of the extractor engages a groove cut into the head of the bolt to force the extractor to move longitudinally with it. The extractor is designed to snap over a cartridge rim whether it is chambered via the magazine or singly loaded. Some extractors have a small hole in the hook recess to match the gas escape hole.

The bolt-stop follows M98 Mauser design and is positioned on the left rear of the receiver. It is securely held there by a screw through the rear end of the bolt-stop and through an integral stud on the receiver. A heavy spring, fitted lengthwise in the bolt-stop and rearward over a separate rest, keeps the bolt-stop against the receiver. Fitted inside the bolt-stop, and held there by the bolt-stop screw, is the ejector. The ejector is made with an integral spring leaf, which provides the tension to move its front end to the right when the bolt is opened. Backward travel of the bolt is halted when its left locking lug comes in contact



U.S. Model 1917 Enfield action.

with that part of the bolt-stop which projects through a hole in the receiver. A grasping lip on the front of the bolt-stop lets it be swung out for bolt removal.

The simple striker mechanism consists of a bolt sleeve threaded into the rear of the bolt, a coil mainspring, a striker (firing pin), and a cocking piece. The cocking piece is held to the striker by double interrupted rings engaging the two parts. Ordnance specifications called for a firing pin protrusion of not over .068", and not under .058" minimum, and a firing-pin hole no larger than .085".

Two gas-escape holes in the front of the bolt direct escaping gases into the left side locking raceway.

Primary striker cocking occurs on raising the bolt handle, when the forward end of the cocking piece engages a shallow cam in the rear of the bolt. Full cocking takes place on the forward travel and closing of the bolt, after it has been fully opened. The shallow cam and the short initial rearward movement given to

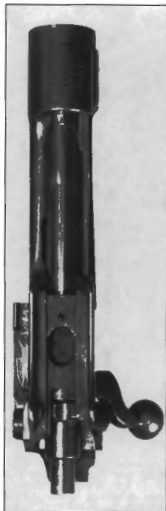
the striker when the bolt handle is raised are safety features which prevent the action from firing a cartridge unless the bolt is locked sufficiently to hold it closed. The cocking piece is engaged when the bolt is open, and also positions and prevents rotation of the bolt sleeve.

The rugged rotary safety, just to the rear of the bolt handle, is built into the tang of the receiver. With the action closed and cocked, tipping the safety lever back locks the striker and bolt. The striker is locked back, and pulled back off the sear, by the end of the safety system engaging a notch cut into the side of the cocking piece. The bolt is locked closed by a pin pushed forward by the safety into a hole in the base of the bolt handle.

The trigger is a common double-stage military type. The long first stage of the pull moves the sear almost all the way off the cocking piece, the final short pull fully releasing it. An added safety feature, built into the sear, is a pin projecting upward through a hole in the receiver. Only when the bolt is fully



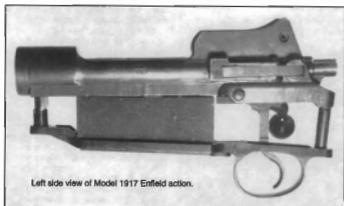
Model 1917 Enfield action open.



Top view of Model 1917 Enfield action.

closed, which places a notch cut into the body of the bolt directly over the pin, can the trigger be pulled to release the striker.

The action is held in the stock by two guard screws, one at either end of the action, passing through holes in the trigger guard plate. Stock bushings, through which the guard screws pass, provide proper spacing between trigger guard and receiver. The magazine box is a separate unit fabricated by riveting two flat thin pieces of sheet steel, which form the sides, to the thicker ends. The top of the front end projects up into the magazine-opening



Left side view of Model 1917 Enfield action.

well to become part of the loading ramp. The magazine box is securely positioned between the trigger guard and receiver, and is partly recessed into these parts. The magazine-well opening in the bottom of the receiver is milled to leave lips for holding the cartridges in place in the magazine. The milled steel floorplate, detachable from the trigger guard, is held in place by projecting lips engaging recesses in the trigger guard, and is secured by a small spring-loaded latch in the guard just to the rear of the magazine box opening. Depressing this latch with a pointed tool, through a hole in the rear of the floorplate, allows the latter to be moved back and released.

The trigger-guard bow is egg shaped, the opening larger in front. The face of the curved trigger is grooved. The milled magazine follower and the follower spring are the conventional Mauser type. The magazine holds six cartridges in a staggered column. When the magazine is empty the follower rises in front of the bolt, when the action is opened, preventing the bolt from being closed. All action parts are made of steel; there are no stampings.

Disassembly

To remove the bolt, grasp the front edge of the bolt-stop with the thumb, swing it outward, raise the bolt handle and pull the bolt out. To remove the floorplate, insert a pointed tool into the hole in the rear of the plate, depress the tool while at same time pulling it to the rear. This releases the floorplate, follower spring and follower.

To remove the barrel and action from the stock, first remove the upper and middle barrel bands and handguard, then remove the front and rear guard screws. Lift the barrel and receiver from stock, then pull out the trigger guard. The barrel is threaded very tightly into the receiver and no attempt should be

made to remove it unless proper equipment is on hand.

Disassemble the bolt by grasping the bolt body in the right hand and, with a tool (such as a small screwdriver) in the other hand, pull the cocking piece back, rotating it and the bolt sleeve counterclockwise about one-half turn. Unscrew the bolt sleeve further until the cocking piece drops down, then repeat the process until the entire striker assembly is removed.

To disassemble the striker mechanism, place the firing pin tip on a hard surface and grasp the bolt sleeve very firmly; pull the bolt sleeve down as far as it will go, then turn the cocking piece one-quarter turn in either direction and lift it off.

To remove the extractor, turn it on the bolt to cover the gas-escape vents, then push it forward to disengage it from the extractor collar. The collar can then be spread apart and removed from the bolt.

Turn out the bolt-stop screw and remove the bolt-stop assembly. Push out the sear pin and remove the trigger/sear assembly. With a small screwdriver turn out the safety-lock holder screw and remove the holder. Swing the safety back, then pull the safety out, after which the safety lock plunger and spring can be removed. Reassemble in reverse order. In reassembling the safety, first insert the safety lock plunger spring, then the lock plunger into the hole in the receiver. Using a screwdriver, turn the lock plunger so its V surface is in line with the hole, then push the lock plunger forward and, at the same time, firmly grasp the front end of the plunger with a pliers. While holding it, remove the screwdriver, insert the safety and release the pliers.

To assemble the bolt-stop, with the bolt forward and the handle raised, lay the action on a bench with the left side up. Position the bolt-stop spring rest on the receiver. Insert the ejector in the bolt-stop then insert the bolt-



Close-up of rear part of Model 1917 Enfield action showing how bolt handle forms safety lug by engaging a deep notch in the receiver (arrow).

stop spring, pressing the hooked end of this spring into the front end of the bolt-stop until it is level with the latter. Position the assembled bolt-stop in place on the receiver, turning the rest to align the groove for the bolt-stop spring. Using a screwdriver handle or similar tool, firmly press the rear end of the bolt-stop against the receiver, then insert and turn in the bolt-stop screw.

Strong and Weak Points

The only really weak part in this action is the ejector. It is a leaf spring which usually breaks off and leaves the ejector useless.

Not a design fault, but rather a construction fault, is that some of the 1917 receivers develop hairline cracks. By no means a common occurrence, it is common enough to be of some concern to owners of these actions. The cracks usually appear some place around the receiver ring, often starting at the front edge of the receiver and extending rearward in an erratic pattern. Although Winchester and Remington receivers have been found with cracks, the Eddystone-made receivers are by far the most frequent offenders. It is believed that many of these receivers were given a faulty heat-treatment, the metal thereby becoming too hard and brittle. Not easily spotted, the cracks are most often detected when the action is polished and reblued. They can often be detected with the naked eye, or by carefully examining the receiver ring with a hand magnifier.

Another good way to detect cracks is to dunk the receiver in gasoline for a moment. If a crack (or cracks) is present, the gasoline will seep from it after the rest of the receiver has

dried. Cracked receivers are generally not repairable, so they should not be used.

While cracks may well be the result of improper heat treatment, they're most frequently found on receivers from which the original barrel has been removed. Barrels were fitted extremely tight in these actions, some tighter than others. It is possible that some of the receivers cracked when the barrels were originally installed, but I believe most of the cracks occur when the original very tight barrel is removed, for unscrewing a tight barrel puts a lot of strain on the receiver.

The cock-on-closing feature is often considered poor design, but that's a matter of opinion. I've fired many shots through these actions, but I've never found this feature objectionable, certainly not to the point where I would spend time and money to change it.

Others have condemned the long striker fall, the seemingly slow lock time, but again I've had no occasion to complain about it. The same goes for the double-stage trigger pull which, if one learns to use it, is almost without fault. At any rate, if any of these features are objectionable there are accessories commercially available to change them. Several firms make single-stage trigger mechanisms for this rifle while two firms make speed-lock and cock-on-opening firing mechanisms.

If it is desired to incorporate all these changes, then installing the complete Dayton-Traister trigger and speed-lock mechanisms seems to be the best solution.

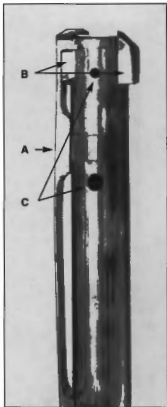
Round-nosed bullets pose a feeding problem, and many cures have been tried. The simplest method is to install a device, the Tru-Feed Kit, made by Dayton-Traister.

Although I've fired several thousand shots with rifles based on the 1917 Enfield action I never experienced a ruptured case head or primer, which might have allowed powder gases to get into the action. Had a serious rupture occurred, I most likely would have got some of this gas in my face, for the design doesn't allow much gas escape through the action other than toward the rear. Drilling a hole in the left receiver wall, opposite the rear vent hole in the bolt, would have helped. Eliminating the two grooves on the striker shoulder would also have helped stop any gases passing back along the mainspring to escape past the cocking piece, and would instead, tend to deflect the gases out of the vent hole in the bolt at this point.

Converting the 1917 Enfield

Besides installing the above mentioned accessories, the 1917 Enfield action can be "gunsmithed" no end.

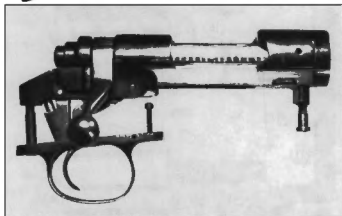
Through the years these rifles were available a great many articles were written on their remodeling and conversion, and all of the major gunsmithing books have covered the



Underside of Model 1917 Enfield bolt showing: (A) extractor, (B) dual-opposed locking lugs, (C) two gas-escape holes.

subject in detail, so I'll just skim over this part.

The unsightly part of this action is the receiver bridge and the protruding sight ears. Removing these ears and rounding the bridge is generally the first thing the amateur gunsmith wants to change. The usual instructions suggest grinding the bridge down to be the same contour as the receiver ring, which is OK—but that still leaves a lot of metal where it is not needed. Top scope mounts for the remodeled 1917 Enfield are usually made for a rear bridge that's the same diameter as the front ring. Be this as it may, I much prefer to grind the bridge down much lower, or to duplicate the bridge on the FN Mauer action, which permits using mounts recommended for that action. At the same time I like to remove all metal directly over the base of the bolt handle, as well as removing metal occupied by the bolt-stop spring rest, leaving only about a 1/16" metal ledge directly behind the



The author's "Baby Enfield" action and the rifle built around it. Yes, this action was once a full-sized 1917 Enfield. It is now just 7.25" long and weighs 2 pounds. Customizing consisted of cutting a section out of the receiver and bolt and welding the sections together again, making and fitting a new bolt handle, removing the safety parts and these alterations: the tang where the safety was located; the receiver bridge to FN Mauser contour; the bolt-stop; the bolt sleeve; the bolt and cocking piece so the striker cocks on opening, and making and installing an adjustable single-stage trigger mechanism. (Above) The "Baby Enfield" rifle chambered for the 219 Improved Zipper cartridge. The 22" barrel has a .224" groove diameter and a 1:14" rifling twist, a muzzle diameter of .700" and weight 3 lbs., 6 oz. The trim walnut stock weighs just 30 oz. and, with the Lyman 5A scope, the complete rifle tips and scales at 8 pounds. This rifle, highly accurate, has accounted for many varmints since it was made in 1942.

bolt-stop. The rear end of the bolt-stop spring can be heated and bent down to ride on this ledge after cutting a bit off the end of the spring. All this eliminates considerable weight and the entire action looks much trimmer. The bridge can be further trimmed to eliminate the clip guide slots.

If one doesn't like the 1917's "dog leg" bolt handle, it can be heated and straightened out and, with some filing, it can be made to look like the old 720 Remington bolt handle. Or a new bolt handle can be lathe-made and welded on in place of the original.

Another odd feature of this action is the crooked front end of the trigger guard plate; unless this is changed the rifle will have a definite belly. Usual practice is to straighten the guard plate by cutting off the front tang, welding it back on and dressing it down so it is straight with the rest of the guard plate. After this the magazine box is cut down so the original front guard screw can be used again. This reduces magazine capacity to five. So far as I know, no firm has ever made a replacement hinged floorplate/magazine/trigger guard for the 1917 Enfield rifle, but a Model 1903 Springfield guard can be installed. If this is done the stock can be made as slim around the action as on the Springfield.

Springfield guard screw hole spacing is not correct for the Enfield action, but can be best

taken care of by filling the rear guard screw hole with weld and drilling a new hole slightly farther to the rear.

Most Enfield receivers have a deep oblong recess milled in the top of the bridge, rather unsightly looking on a finished sporter. After the sight ears have been removed and the bridge dressed down nearly to the desired point, this recess can be filled. A simple method is to use glass bedding compound dyed blue/black. If the inside of the recess is cleaned thoroughly and the sides nicked a bit, the compound will become a permanent part of the receiver. To advance this idea a bit further, a piece of steel can be concealed in the compound in case an extra scope mount screw hole is needed in this area. The recess could also be filled with steel weld; preferably this should be done by partly filling the recess with a piece of steel and then filling in with electric weld.

Rebarreling

The 1917 Enfield was made for the 30-06 cartridge, consequently it is equally suitable for other cartridges of 30-06 length and head diameter. Therefore no changes need be made in this action when rebarreled to commercial cartridges such as the 25-06, 270, 280, and 35 Whelen. This action is also most suitable for cartridges slightly shorter than the 30-06, and

without any changes it can handle the 6mm, 257 Roberts, 6.5x57, 7x57mm, 8x57mm and 9x57mm.

Even such shorter cartridges as the 243 or 308 will usually feed quite well from the magazine into the chamber. The rear and/or the front of the magazine box could be blocked off for the shorter cartridges but this is not usually necessary unless 100 percent flawless feeding is required.

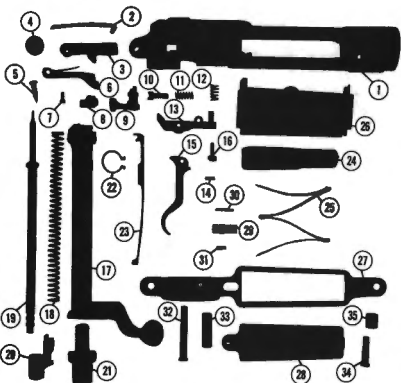
After enlarging the recess in the bolt face and shortening the extractor hook, this action is quite ideal for the family of short belted magnum cartridges, such as the 264, 7mm, 300, 338 and 458 Magnums. If, in addition to the bolt face alteration, the magazine is made longer, this action is also suitable for the longer belted magnum cartridges—the 300 and 375 H&H Magnums and others. It is, however, always necessary to file down the magazine-well lips to make the magazine well wider when used with belted magnums. I've used the 1917 Enfield action for a wide variety of cartridges, from the 22-250 to the 450 Magnum, but because it is a big action I consider it best for such big bore heavy-recoiling cartridges as the 35-Whelen, 338 Magnum and 458 Magnum.

Although it has been nearly 50 years since the two million-plus 1917 actions and rifles were made, they are still very common.

PART I: Military Rifles & Actions

Parts Legend

- 1 Receiver (top view)
- 2 Bolt-stop spring
- 3 Bolt stop
- 4 Bolt-stop spring rest
- 5 Bolt-stop screw
- 6 Ejector
- 7 Safety-plug screw
- 8 Safety plug
- 9 Safety
- 10 Safety-lock plunger
- 11 Safety-lock plunger spring
- 12 Trigger spring
- 13 Seer
- 14 Trigger pin
- 15 Trigger
- 16 Seer pin
- 17 Bolt
- 18 Main spring
- 19 Firing pin
- 20 Cocking piece
- 21 Bolt sleeve
- 22 Extractor collar
- 23 Extractor
- 24 Follower
- 25 Follower spring
- 26 Magazine box
- 27 Trigger guard
- 28 Floorplate
- 29 Magazine catch
- 30 Magazine-catch pin
- 31 Magazine-catch spring
- 32 Rear guard screw
- 33 Rear stock (guard-screw) bushing
- 34 Front guard-screw
- 35 Front stock (guard-screw) bushing



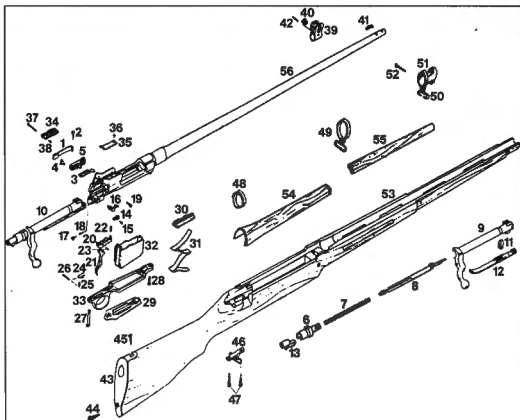
1917 U.S. Enfield (Uses .30-06 cartridges)

Dimensional Action Specifications

Weight	58 oz.
Receiver length	8.875"
Receiver ring dia.	1.385"
Bolt body dia.	.695"
Bolt face recess (partially recessed)	
Depth	.046"
Dia.	.485"
Bolt travel	4.740"
Striker travel	7.000"
Guard screw spacing	8.00"
Magazine well opening	
Length	3.400"
Rear width	.525"
Front width	.550"

General Specifications

Type	Turn-bolt repeater.
Receiver	One-piece machined steel forging with non-slotted bridge. Stripper clip guide milled in bridge.
Bolt	One-piece with dual-opposed forward locking lugs. Base of bolt handle acts as a safety lug. Low-profile bolt handle will clear low-mounted scopes.
Ignition	One-piece firing pin, coil mainspring and cocking piece. Cocks on closing.
Magazine	Staggered-column non-detachable five-shot box magazine. Detachable floorplate.
Trigger	Non-adjustable, double-stage military type pull.
Safety	Right-side rotary type, about 160° swing. Locks striker and bolt when swung rearward.
Extractor	One-piece non-rotating spring type attached to bolt body by a collar.
Bolt-stop	Separate, hinged to left rear of receiver. Stops rearward bolt travel by contacting left locking lug.
Ejector	Swinging type in bolt stop housing.



Parts Legend

- 1 Bolt Stop Spring
- 2 Bolt Stop Screw
- 3 Ejector
- 4 Bolt Stop Spring Rest
- 5 Bolt Stop
- 6 Bolt Sleeve
- 7 Main Spring
- 8 Firing Pin
- 9 Bolt, Stripped
- 10 Bolt, Complete
- 11 Extractor Collar
- 12 Extractor
- 13 Cocking Piece
- 14 Safety Lock Holder
- 15 Safety Lock Holder Screw
- 16 Safety
- 17 Safety Lock Plunger
- 18 Safety Lock Plunger Spring
- 19 Sear Pin
- 20 Sear
- 21 Trigger
- 22 Sear Spring

- 23 Trigger Pin
- 24 Floorplate Catch
- 25 Floorplate Catch Spring
- 26 Floorplate Catch Pin
- 27 Rear Guard Screw
- 28 Front Guard Screw
- 29 Floorplate
- 30 Follower
- 31 Magazine Spring
- 32 Magazine Box
- 33 Trigger Guard
- 34 Rear Sight
- 35 Rear Sight Base Spring
- 36 Rear Sight Base Screw
- 37 Rear Sight Axis Screw
- 38 Rear Sight Axis Nut
- 39 Front Sight Carrier
- 40 Front Sight Blade
- 41 Front Sight Spline
- 42 Front Sight Pin
- 43 Buttplate
- 44 Buttplate Screw, Large
- 45 Buttplate Screw, Small
- 46 Rear Swivel Assembly

- 47 Rear Swivel Base Screws
- 48 Handguard Ring
- 49 Lower Band Assembly
- 50 Stacking Swivel
- 51 Upper Band
- 52 Upper Band Screw
- 53 Stock
- 54 Handguard, Lower
- 55 Handguard, Upper
- 56 Barrel

Parts Not Shown

- Follower Depressor
- Front Guard Screw Bushing
- Lower Band
- Lower Band Screw
- Plate Spring
- Rear Guard Screw Bushing
- Rear Sight Slide
- Rear Sight Slide Spring
- Rear Swivel Base
- Sling Swivel
- Stacking Swivel Screw

Part II Pattern 14 Enfield

CHRONOLOGICALLY this part should precede the 1917 Enfield but since the P-14 action and rifle aren't nearly as important to the average reader, I've given them a second place.

For a detailed review of the history and development of the British P-14, I suggest readers get *The Lee-Enfield Rifle*, by E.G.B. Reynolds, and read Chapter 11.

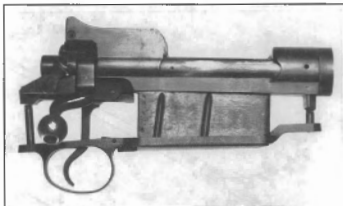
Briefly, the British became interested about 1910 in adopting a different military cartridge and a new shoulder arm to replace the old 303 British cartridge and the two-piece stocked Lee-Enfield rifle.

The cartridge favored was of .276-caliber in a rimless bottlenecked case. The Small Arms Committee which had supervised development recommended the new rifle be based on a Mauser-type turnbolt action, and made similar to the 1903 Springfield. The trial rifle was developed by Royal Small Arms Factory at Enfield Lock, Middlesex, England. After some testing, in competition with other rifles, the Enfield rifles showed promise. It was decided that 1000 of these rifles he made and thoroughly tested before making any final decision on the rifle or cartridge. This was in 1913, and the arm was named "Rifle, Enfield, Caliber .276, Pattern of 1913."

The 1000 Pattern 13 rifles were manufactured at Enfield and distributed to various British troops for extensive testing. The .276 cartridge did not perform as expected, metal fouling being the major problem. Some minor faults found in the rifle were easily corrected, and after the trials the Enfield plant made up six new rifles without these faults. It was now 1914. England had got involved in World War I, so all further experiments and trials of the .276 were dropped.

However, the British had developed a good rifle, and they were in desperate need of many rifles to arm their troops. The British arsenals were still tooled up to make the Lee-Enfield rifles in quantity, so it was decided to retain this arm, and have the new rifles, chambered for the 303 British cartridge, made elsewhere. It was thus that the British awarded contracts to the three U.S. firms to make the new Enfield. This was in 1914, and the new rifle then became known as the Model (or Pattern) 1914 Enfield.

The three firms were Winchester, Remington and Eddystone. During 1915, 1916 and 1917 Winchester made about 245,866 rifles for England, Eddystone made about 450,000 and Remington probably made more. In March of 1917, shortly before the British contract was canceled, Remington made up to 61,000 P-14 rifles in that one month alone.



Pattern (P-14) 1914 Enfield action made for the 303 British cartridge. Note the two grooves in the side of the magazine box, grooves which produce ridges inside the box, and which are needed for the rimmed 303 British cartridge.

The Pattern 14 (P-14) Action

The P-14 Enfield action is essentially like the 1917 Enfield except that it is made to handle the rimmed 303 British cartridge.

Here are the specifications of the P-14 action which differ from the 1917 Enfield action.

Bolt face recesses:

Dia.545"

Depth60"

Magazine box length3.08"

Receiver well opening:

Length3.195"

Front width566"

Rear width610"

The parts that are different are the receiver, bolt, magazine box, follower, ejector and extractor.

The P-14 receiver differs in having a wider magazine-well opening, milled to hold and guide the 303 British round. The P-14 bolt had a larger diameter cartridge head recess, and a left locking lug with a rounded front end.

The extractor has a narrow hook and this hook is well beveled so that the extractor will easily slip over the rim of a cartridge that is chambered ahead of the extractor. The P-14 ejector is longer than the Model 1917 ejector, and the P-14 receiver has a longer ejector slot to accommodate it.

The biggest difference between these two actions is in the magazine box and follower. The P-14 magazine box has sides made of heavy gauge sheet metal into which grooves are pressed to form rounded ridges in the rear of the box guide and hold

the cartridges by their rims, and in loading the 303 British rounds into the magazine in the normal way their rims slide to the rear of these ridges. The rear ridges as well as the rear wall of the magazine box, angle slightly to the rear, and as more than one cartridge is pressed into the magazine each preceding cartridge moves back a little so that the rim of the succeeding one will be ahead of the one below it. This does a lot to help eliminate the problem of incorrect overlapping of the cartridge rims to prevent feeding jams. The rear ridges also hold the cartridges securely in the magazine so that they cannot move forward when the rifle recoils and thus protecting the points of the bullets. The second ridges are near the center of the magazine box and these merely position and hold the cartridges away from the side walls so that the bullets in the cartridges are pointed to feed correctly.

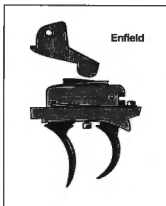
The P-14 follower has a rib along its left side to stagger the cartridges in the magazine, and this rib is square in buck to halt the forward movement of the bolt when the magazine is empty, but it differs from the Model 1917 follower in that its right front groove curves upward to properly guide the last cartridge in the magazine so its bullet will clear the loading ramp as it is fed out.

The P-14 action will handle the 30-40 Krag cartridge as well as the 303 British. Since it is a very strong action it would be ideal for rebarreling to any wildcat cartridge based on the 303 British or 30-40 Krag case, such as the 22/303, 22/4000 Krag, 25/303, 25 Krag, 25 Krag Improved and 35 Krag.

While the P-14 bolt face and extractor are correct for the 300 H&H belted magnum head



Bolt head of the 1917 (right) and the P-14 Enfield (left). Note extractor hook and left locking lug.



Stoeger Arms Corp. once sold (about 1939) a double-set trigger mechanism especially made for the P-14 Enfield.

size, the magazine is too short to handle any of the popular commercial and wildcat cartridges based on this case. However, by substituting the 1917 magazine box and follower it will handle most of these cartridges, and thus be ideal for rebarreling to such short belted magnums as the 264, 7mm, 300, 308 Norma and others. The magazine well and guide lips usually need some work to obtain perfect feeding.

Since the time P.O. Ackley first popularized the "improved" cartridge rechamberings, one which responded favorably to this treatment was the 303 British.

After the standard 303 British cases are fire formed (blown-out) by firing them in the

"improved" chamber, careful handloading can result in considerably higher velocity.

There are a number of rifles chambered for the 303 British cartridge, but the P-14 is the only bolt-action rifle for which the 303 British Improved rechambering can be recommended, because it is a strong action and can safely handle pressures higher than the factory loaded 303 British cartridge normally develops. The "improved" rechambering is a simple job, and it offers the handloader more energy and velocity than the factory load can deliver.

P-14 actions are fully as strong and safe as the 1917 Enfield actions and, as with the 1917s, those with the Remington and Winchester names are preferred over the Eddys-

tones. Because the 303 British cartridge has long been very popular in Canada, the P-14s have also been popular there; a great many of them were remodeled and sporterized for big game hunting. The P-14 rifle can be so treated just like the 1917 Enfields, and the illustration of the Remington Models 30, 30S and 720 show what can be done with either rifle.

It was good news when in the early 1990s a large quantity of P-14 rifles were unearthed and made available again from a couple of surplus arms dealers. I obtained one for its action, shortened it and modified it to be used as a single shot. I have not as yet chosen a cartridge for it but most likely it will be the 219 Donaldson Wasp.



French Military Turnbolts

THE FIRST IMPORTANT metallic cartridge shoulder arm adopted by France was the Model 1874 Gras single shot rifle—developed by General Basile Gras (1836-1901) of the French Army. This turnbolt arm evolved from the bolt-action breech-loading Model 1866 Chassepot needle-fire rifle, so called because the firing pin was needle-like to penetrate the self-consuming paper or linen cartridge, and strike the priming mixture positioned at the base of the bullet. The Gras rifle was chambered for the 11x59R French Gras centerfire cartridge, developed and adopted with the Gras rifle in 1874. Usually called the 11mm Gras, this cartridge is very similar to, but not interchangeable with; such other 43-caliber cartridges of the same period as the 11mm Mauser, 11mm Murata and 11mm Wernli. The Gras rifles (there were three principal versions having barrels of different lengths) were widely used in countries other than France.

Unlike some other 11mm foreign military arms, Gras rifles never were commonplace in the United States. Even before the Model 1874 Gras rifle was officially adopted, France converted many of her older M1866 Chassepot needle-fire rifles to the Gras system to handle an 11mm self-contained cartridge.

The Gras rifle had a very simple action. The bolt was locked in the receiver by the heavy base of the bolt handle engaging in front of the receiver bridge. The extractor was fitted in the separate bolt head. The action cocked by lifting the bolt handle. There were two notches under the cocking piece and a checkered thumbpiece depression on top that positioned the striker at "half-cock." It had no safety. The stock was of one-piece construction. Gras rifles, of value only to military arms collectors, are quite scarce today in original and very good condition.

The Kropatschek Rifle

After the single shot Gras was in production for a few years, there was a growing demand for a repeating rifle. An Austrian inventor named Alfred Kropatschek worked out a method to make the Gras rifle into a repeater. France adopted his system about 1878, and it became known as the Model 1878 Gras-Kropatschek. The repeating mechanism consisted of a Henry-type tubular magazine in the forend, under the barrel, and a pivoting cartridge carrier positioned under an opening in the bottom of the receiver. The magazine was loaded by pushing the cartridges into it through the opened action. On closing the bolt, the carrier would tip down, allowing one cartridge to move back onto the carrier platform. On opening the action the bolt would tip the carrier up, placing the nose of the cartridge in line with the chamber. On closing the bolt, the cartridge would be pushed into the chamber and the carrier depressed again to pick up another round. Gras-Kropatschek rifles were used largely by the French Navy. Like the Gras rifle, the Gras-Kropatschek rifles had a one-piece stock. They are quite rare and are prized by arms collectors.

The Lebel Rifle

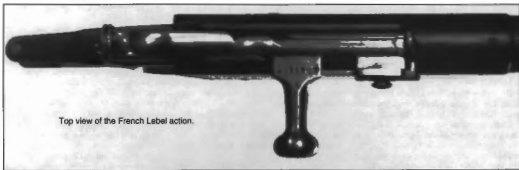
The original Gras rifle and the Gras-Kropatschek repeater were soon obsolete by improved rifle and cartridge designs. In France, a commission was set up to develop a new rifle and cartridge. Headed by General Tramond of the French Army, Colonel Nicolas Lebel was one of the other leading men on this board. The result of their efforts was the adoption of a new rifle and cartridge in 1886.

Actually, the new rifle was merely an improvement of the Gras-Kropatschek rifle. The cartridge, however, was really new; it was the first relatively small-bore smokeless powder cartridge to be adopted by any world power. Lebel is credited with being largely responsible for developing this cartridge, and on this account it was named after him. He probably had a hand in the design improvements of the rifle too (some sources refer to the "Lebel System"), but the rifle bore his name largely because of the cartridge. At any rate, the cartridge is now universally known as the 8mm Lebel, and the rifle as the French 8mm Model 1886 Lebel, or variations thereof.

Actually, the Lebel action is a major "beef-up" job on the Gras-Kropatschek. The changes consisted mainly of providing a box-like receiver to house the action parts, incorporating dual-opposed locking lugs on the bolt head, and making the receiver accordingly. This made the action much stronger to handle the more powerful 8mm Lebel cartridge.

The Lebel receiver is a long box-like housing. The barrel is threaded into the top front of this housing. The separate forend containing the magazine tube is attached to the barrel by two bands and a hook at the rear of the magazine tube—engaging a recess in the front of the receiver. The separate buttstock is attached to the rear of the receiver by two tang screws. One of these screws connects the separate lower tang to the upper tang (an integral part of the receiver) while the second screw passes through a plate inletted into the bottom of

(Pictured above) French Model 1886/93 Lebel rifle chambered for the 8mm Lebel cartridge, has two-piece stock and a tubular magazine under the barrel in the forend.



Top view of the French Lebel action.

the stock grip and threads into the upper tang.

The top of the receiver is bored and milled to accept the bolt assembly and provide one opening for loading and another below the bolt for the carrier. The bolt handle and its heavy rectangular base are integral parts of the bolt, positioned about midway on the bolt body. The receiver bridge is slotted to allow passage of the bolt handle.

When the bolt is locked, the heavy bolt handle base becomes the safety lug ahead of, but not contacting, the right wall of the bridge. At the front of the bolt body, in line with the bolt handle base, is another heavy rectangular lug. The separate bolt head has a stem which fits into the front of the bolt body. A heavy stud screw, threaded into this forward lug and extending into a hole in the stem of the bolt head, holds the head to the body so it can rotate with the bolt.

The locking lugs are positioned on the forward end of the bolt head. When the bolt is locked the locking lugs are horizontal—just as the Russian Model 1891 Moisin-Nagant.

The left (lower) locking lug contacts the cartridge carrier to tip it up and halt the rearward travel of the bolt when the bolt is opened. The extractor is mortised into the bolt head. The face of the bolt head is recessed for the cartridge rim.

The firing mechanism—firing pin, main-spring, cocking piece and firing pin button—is essentially like that in the Berthier action to be described later.

The feeding and trigger mechanisms of the Lebel rifle are not attached to the receiver, but rather to the carrier plate which closes the bottom of the receiver. The trigger guard, combined with the lower tang, is attached to this plate with a screw. The entire assembly is held in the receiver by a lip at the front of the carrier plate engaging in a groove in the receiver, and by one screw through the rear of the receiver.

The sear is pivoted and attached to the upright projection on the carrier plate on the pivot axis of the magazine cutoff lever. The trigger pivots on the sear via a pin. A V-type spring compressed between the sear and the carrier plate tensions the sear.

The cartridge carrier is also held in place by, and pivots on, the axis of the magazine cutoff lever. The carrier is tensioned to keep it either in the up or down position by a lever and a flat spring. The front end of this pivoting lever also functions as the cartridge stop at the magazine tube opening. The carrier is tipped up when the bolt is opened by the lower locking lug contacting a lug on the rear of the carrier. It is tipped down when the bolt is closed (and locked) by the base of the bolt handle depressing a lever linked to the carrier.

The checkered round button of the L-shaped magazine cutoff extends to the bottom rear edge of the receiver housing. Swinging this button forward disengages the carrier-depressing lever so that the carrier remains in the tipped-up position when the action is opened. The rifle can then be conveniently loaded and used as a single shot while cartridges in the magazine are held in reserve.

The M86 Lebel action (as well as the rifle) underwent some changes to improve it; the result was designated the Model 1886/93—



French Lebel action.

PART I: Military Rifles & Actions

presumably, the changes were adopted in 1893. The M86 receiver was made with a long forward extension into which the barrel was threaded. This extension, called the barrel reinforce, accounts for the extra length of this receiver when compared to the M86/93 receiver, as shown in the specification chart. The bolt head to bolt body junction on the M86/93 was strengthened by the addition of a separate collar and lug between these two parts. The latter action was also made safer by having a small gas vent hole in the bolt head, plus other minor changes. These various improvements made the M86/93 action considerably stronger and more reliable than the M86. M86/93 rifles are usually marked to indicate the 1893 changes by *Modele 86/93*

as the 1886, but has the improved action; and 3) the 1886/93 R35 carbine has a 17.7" barrel, is about 37.65" overall and weighs about 7.84 pounds. The carbine is merely a modification of the Model 1886/93 rifle—shorter barrel, forend and magazine tube holding only three cartridges, and different sights. It is one of the shoulder arms used by the French army during WWII, indicating the reluctance of France to discard old rifles.

Lebel rifles were not very satisfactory militarily; the tubular magazine could not be loaded quickly and it could be dangerous if loaded with spitzer-point bulletted ammunition.

Quite to my surprise, on taking apart the Lebel rifle (illustrated) I found the entire rifle

can then be removed. Reassemble in reverse order.

To disassemble the bolt, remove the extractor by raising the hook end with a screwdriver, then drive the extractor to the rear. To remove the firing mechanism from the bolt, first rotate the cocking piece counterclockwise so it falls against the bolt body. Turn the firing pin button so its slot aligns with the notch in the rear of the thumbpiece on the cocking piece. Grasp the bolt and cocking piece firmly and, placing the firing pin tip on a hard surface, press down on the bolt until the firing pin button clears the cocking piece and can be slipped off to one side. The firing pin and mainspring can now be removed. Reassemble in reverse order.



or M 93 stamped on the left side of the receiver.

The caliber designation was not stamped on the Lebel rifles. They were serial numbered, however, with the full number usually stamped on the bolt handle base, barrel breech, receiver and carrier plate—last two digits of this number were stamped on some of the other important parts. Various inspector's arsenal and proof marks are stamped on the breech end of the barrel, receiver and bolt. Date of manufacture (year) is usually stamped on the breech end of the barrel, as well.

Lebel Models

There were three principal models of the Lebel: 1) the 1886 rifle has a 31.4" barrel, is 51.3" overall and weighs about 9.3 pounds; 2) the 1886/93 rifle has the same specifications

well made. The action parts were very nicely finished, fitted and polished. In fact, parts like the springs, levers, sear and some bolt parts were flawlessly polished. While the design of the action and rifle can be criticized, quality workmanship is evident, especially in the action.

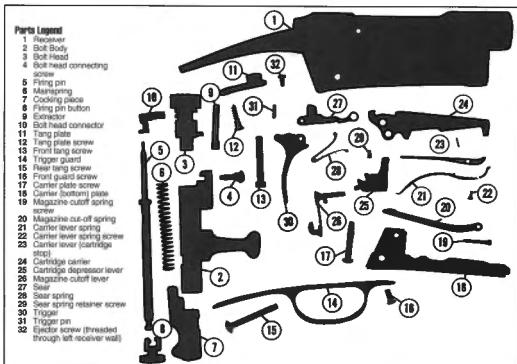
All true French rifles are much more common in the United States than are the French Gras and Gras-Kropatschek rifles. The Lebel rifles are of more value and interest to the collector than to anyone.

Takedown and Assembly/Lebel

To remove the bolt, raise bolt handle and pull the bolt back about halfway. Turn the large-headed screw out of the forward bolt lug, turn the bolt head one-quarter turn clockwise and, while holding the bolt head, pull the bolt from the receiver. The bolt head

To remove the carrier plate assembly, remove the rear tang screw and the carrier plate screw from the left side of the receiver and, grasping the trigger guard bow, pull the assembly out of the receiver. The buttstock can now be removed by turning out the front tang screw. Take off the forend by removing the two barrel bands, depressing the magazine follower with a finger from inside the receiver, and then lifting the front of the forend away from the barrel until it is free. Reassemble in reverse order.

Disassemble the trigger and carrier mechanism as follows: remove the screw from the right side of the carrier plate which aligns with the bottom leaf of the trigger spring and, using pliers, pinch the spring together, pull it to the right and remove. Remove the screw from the left front of the carrier plate and remove the magazine cutoff spring and carrier



French Lebel M1886 and 1886/93
(Uses 8mm Lebel cartridges)

Dimensional Action Specifications

Weight (approx.)	58 oz.
Receiver lengths:	
Model 1886	12.5"
Model 1886/93	10.5"
Receiver width	1.250"
Bolt dia. ....	.720"
Bolt travel	3.650"
Striker travel .....	.550"
Bolt face recess:	
Dia. ....	.635"
Depth .....	.0722"

er lever spring; with the magazine cutoff button straight down, lift it out. The cartridge carrier, sear and carrier lever (cartridge stop) can now be removed and separated. Drive out the trigger pin to remove the trigger from the sear. Turn out the carrier lever spring screw to separate it from the carrier lever. Remove the trigger guard front screw and drive the guard rearward to separate it from the carrier plate. Reassemble in reverse order.

Lebel rifles, as well as the Berthier and MAS rifles described later, have two types

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece machined steel forging with integral upper tang. Slotted bridge. Lower tang/trigger guard separate part fastened to receiver with screw. Made for two-piece stock.
Bolt	Two-piece with dual-opposed locking lugs on separate bolt head. Base of bolt handle is safety lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening bolt.
Magazine	Tubular magazine in fore-end loaded through opened action. Eight-shot capacity for rifle.
Trigger	Non-adjustable, double-stage military pull.
Safety	None provided.
Extractor	One-piece spring type mortised into the bolt head.
Magazine cutoff	Lever type positioned at rear right side of receiver.
Bolt-stop	No separate bolt stop; see text.
Ejector	Stud screw threaded into the left receiver wall.

of screws. The main screws that are removed for field-stripping (bolt head, trigger guard, magazine housing and carrier plate screws) are slotted so they can be removed with a screwdriver or similar tool. Practically all other screws are unslotted and require special two-pronged screwdrivers to remove them.

The Berthier Rifle

The Lebel design was soon superseded by another, and similar, turnbolt system. M. Berthier, a Frenchman and an officer of the Algerian Railway Company, adapted a Mannlicher-type magazine to the Lebel 8mm rifle, eliminating the unsatisfactory tubular

French Berthier action with five-shot magazine.



magazine. The main changes were as follows: 1) the "housing" type receiver was made more like a conventional receiver; 2) cartridge-carrier mechanism and tubular magazine were replaced by a single-column magazine under the receiver, making it largely a separate part of the action; 3) the two-piece stock was replaced by a one-piece design; 4) relocating the dual-opposed locking lugs on the bolt head so that they are vertical when the bolt is locked, and the receiver machined accordingly.

A carbine form of the new design was adopted in 1890, chambered for the 8mm Lebel cartridge. In time, various rifles and carbines were developed around the Berthier action, these becoming the standard French shoulder weapon in both World Wars. By far the most common French military rifle, it is one of the few foreign arms that appeared on the surplus market after both wars. Remington made several thousand "Lebels" for France during WW I which were never delivered; these were the

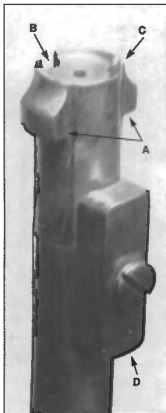
first ones offered on the U.S. market.

The Berthier rifles and carbines have long been known as "8mm Lebel" rifles, perhaps because they're chambered for the 8mm Lebel cartridge, but the correct designation is the "Berthier." In any case, the French rifle discussed here has a single-column Mannlicher-type magazine.

In the 1920s and '30s many of these rifles were imported and sold at very low prices and they became the first French rifles to be sporterized. In the 1930s Stoeger offered a sporter stock for it, and other commercial stockmaking firms followed suit. Although most firearms experts and gun writers dismiss this action as being wholly unsatisfactory for a hunting rifle, the fact is that many of them have been remodeled in years past.

The Berthier Action

The receiver is machined from a one-piece steel forging. The barrel is securely threaded into the receiver. The V-type threads are right



Bolt head of the Berthier bolt showing: (A) dual-opposed locking lugs, (B) ejector slot, (C) extractor and (D) bolt guide lug and screw.

Berthier action, open.



hand. The barrel breech is slightly coned and part of its circumference is beveled for the extractor. The receiver bridge is slotted to allow passage of the bolt handle. The right wall of the receiver is partially cut away for loading and allows the bolt to be turned down to the locked position. Raceways are milled inside the left and right walls of the receiver for passage of the locking lugs. The raceways end abruptly inside the bridge. The magazine well opening is milled from the bottom of the receiver to allow insertion of the clip and cartridges. The cartridge loading ramp begins at a point about midway in this opening, narrowing toward the front and sloping upward to guide the cartridges into the chamber.

There is no recoil lug as such, but a slotted lug under the receiver ring is fitted with a cross pin to engage the front end of the magazine wall. Two flat surfaces at the rear tang junction take up most of the recoil, but other parts of the receiver and trigger guard also absorb some recoil and prevent the action from moving back in the stock.

The magazine shell is attached to the trigger guard by two screws. The follower assembly (follower arm, follower plate, two flat springs and a screw) is positioned by and pivots on, a screw in the front of the shell. The front part of the trigger guard provides a housing in which the clip latch and trigger are fastened—a single V-spring tensions both parts. The top of this housing extends into the bottom of the receiver and is attached by a screw passing through the receiver and the housing. The receiver and the magazine/trigger guard are held together in the stock by this screw, the hook on the front of the magazine shell engaging the receiver and the two guard screws which connect the rear of the trigger guard to the receiver.

The trigger let-off is the usual double-stage type. The Berthier trigger, like that of most other French military rifles, is practically straight and extends into the guard bow like a peg or stick.

There were several variations in the Berthier magazines—all required a clip. The car-



Left side of the French Berthier action.

tridges are first placed in the clip, then the clip and cartridges are inserted into the magazine through the top of the open action. When fully inserted, the clip latch holds the clip and cartridges down against the pressure of the follower. After the last cartridge is fed from the clip, the clip drops free from the bottom of the magazine.

Most early Berthier rifles had a three-shot magazine capacity, with the rear bottom part of the magazine open for the empty clip to drop free. Later, the magazine was modified to hold a clip of five cartridges. This extended the magazine well below the trigger guard. The bottom shell or cover of this magazine has a hinged cover plate to block the clip opening and retain the clip within the action after the last cartridge is fed from it. The cover plate can be opened, allowing the clip to fall out. Many Berthiers were made for the five-shot clip, while many three-shot rifles were later converted to the five-shot system.

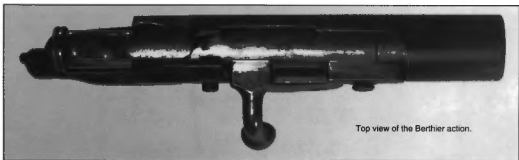
The bolt assembly, rather complex, has a separate head with dual-locking lugs at the front; neither lug is slotted. The simple hook spring-extractor is dovetailed into a slot cut into the bolt head. The bolt face, recessed for the cartridge rim, is cut only for the extractor and ejector.

The bolt handle has a heavy rectangular

base which appears to be an integral part of the bolt body. When the bolt is locked, this heavy base is in front of the receiver bridge and becomes the safety lug. On the front of the bolt body, in line with the bolt handle base, is a heavy lug which acts as a bolt guide. This lug extends forward of the bolt body and is notched to engage over a small lug on the bolt head when it is in place. In addition, there is a large-headed screw threaded through this lug and into a hole in the bolt head. The notch, lug and screw hold the bolt head in place, preventing it from rotating on the bolt body.

The bolt body is drilled from the front to accept the coil mainspring and the one-piece firing pin. When the bolt head is in place the mainspring is compressed between a shoulder on the firing pin and a collar in the rear of the bolt body.

The heavy cocking piece fits over the back end of the firing pin, which projects from the bolt body. The firing pin is anchored within the cocking piece by a double hooked button fitted in the rear of the cocking piece and engaging notches on the end of the firing pin. On top of the cocking piece there is a heavy lug which fits the slot in the receiver bridge. Below this lug is a cocking cam matching a notch in the bolt body. The action is cocked on lifting the bolt handle.



Top view of the Berthier action.



French Model 1916 Berthier rifle chambered for the 8mm Lebel cartridge.

The Berthier action has no safety, no magazine cut-off, nor any separate bolt-stop. The bolt stops when the locking lugs contact the ends of the lug raceways in the bridge. The ejector is merely a small projection on top of the housing on the trigger guard which protrudes into a groove in the bolt body and head.

Operation

To load, raise the bolt handle and pull the bolt back. Insert a fully- or partially-loaded clip into the opened action, pressing the cartridges down until the clip latch has engaged the clip. Pushing the bolt forward moves the top cartridge out of the clip into the chamber, allowing the follower to raise the next cartridge in the clip against the bolt. Turning the bolt handle down locks the cartridge in the chamber and the action is cocked. Pulling the trigger releases the firing mechanism, discharging the cartridge. On raising the bolt handle, the striker is cocked and the fired case is cammed back when the front of the bolt guide rib moves over the inclined surface of the receiver ring. Pulling the bolt back draws the case from the chamber, ejecting it up and to the right. When the last cartridge is fed from the clip, the clip is free to drop of its own weight, either falling from the magazine or when the hinged cover plate is opened. To unload a full- or partially-loaded clip, open the bolt and slightly depress the cartridges and clip while pressing the clip latch in the trigger guard. Releasing the pressure on the cartridges allows the clip to rise and be pulled from the action.

Takedown and Assembly

To remove the bolt, raise the bolt handle and pull the bolt about halfway back. With a large screwdriver remove the large-headed screw from the bolt guide rib lug. Move the bolt until the bolt head can be turned free from the bolt body, then pull the bolt to the rear and lift out the bolt head. Reassemble in reverse order.

To disassemble the firing mechanism, remove the bolt from the action and rotate the cocking piece counterclockwise so it falls against the bolt body. Turn the firing pin button so its slot aligns with the notch in the thumbpiece on the cocking piece. Grasp the bolt and cocking piece firmly and, placing the firing pin tip on a hard surface, press down on the bolt until the firing pin button clears the cocking piece and can be slipped off. The firing pin and mainspring can then be pulled from the bolt. Reassemble in reverse order.

To remove barrel and action from the stock, remove the barrel bands from the forend. Remove the screw from the right of

the receiver bridge and the screw from the rear of the trigger guard, grasp the trigger guard and pull it out of the stock. Remove the tang screw and lift the action and barrel from the stock. All other parts can then be removed by turning out various screws and driving pins from the receiver and magazine units. Reassemble in reverse order. The barrel should not be unthreaded from the receiver unless absolutely necessary, and then only if the proper tools are available.

Comments

The French Berthier rifles (there are many models and variations) were rugged and serviceable military weapons and their long use has proved this. The action is strong and safe enough for the 8mm Lebel cartridge. The rifles, provided the bore is in excellent condition, are generally quite accurate. Feeding, ignition, extraction and ejection are positive and reliable.

All action parts are well made, generally, well-finished and smooth. No doubt good steels were used in the manufacture and heat-treated where needed. All in all, Berthier rifles are good.

However, the Berthier action has a number of faults and undesirable features. The worst feature is that a special clip must be used to fire the rifle as a repeater. Requiring the bolt to be separated before it can be removed is also bad. The lack of a safety may also be highly undesirable. The five-shot magazine projecting so far below the stock is never liked, and the belly of the three-shot magazine is often disliked.

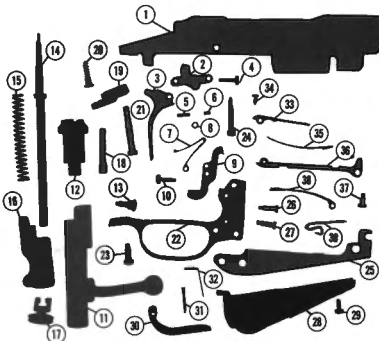
Berthier Markings

Usually the place of manufacture and the model designation are stamped on the left side of the receiver, such as: *St Etienne Mle 1892*.

Since many Berthiers were "transformed" to another model at a later date, the original model designation may not always be correct. The serial number is stamped at the base of the bolt handle and breech end of the barrel. The date of manufacture (year) is usually stamped on the breech end of the barrel as well, along with an assortment of inspector's, arsenal and proof marks. Sometimes there are two dates stamped on the barrel; the earliest date probably indicating when the rifle was made originally and the later date perhaps showing the year of "transformation." The letters MAC, MAS or MAT are often stamped on the barrel. These indicate the French arsenal where the rifle or barrel was made, or where it was rebuilt or transformed. In each case, the letters MA stand for "Manufacture d'Armes," and the last letter—C, S or T—indicates the arsenal located at Châtelleraut, St. Etienne or Tulle.

Parts Legend

- 1 Receiver
- 2 Sear
- 3 Trigger
- 4 Sear screw
- 5 Trigger pin
- 6 Trigger spring roll pin
- 7 Trigger spring
- 8 Trigger spring roll
- 9 Clip latch
- 10 Clip latch screw
- 11 Bolt body
- 12 Bolt head
- 13 Bolt head connecting screw
- 14 Firing pin
- 15 Main spring
- 16 Cocking piece
- 17 Firing pin button
- 18 Extractor
- 19 Tang plate
- 20 Tang plate screw
- 21 Tang screw
- 22 Trigger guard
- 23 Rear trigger guard screw
- 24 Front trigger guard screw
- 25 Magazine shell
- 26 Upper magazine shell screw
- 27 Lower magazine shell screw
- 28 Magazine extension cover
- 29 Magazine extension cover screw
- 30 Magazine cover plate
- 31 Magazine cover plate screw
- 32 Magazine cover plate spring
- 33 Follower plate
- 34 Follower plate screw
- 35 Follower plate spring
- 36 Follower arm
- 37 Follower arm screw
- 38 Follower arm spring
- 39 Follower arm spring platform



French Berthier Model 1890 (and later)

(Uses 8mm Lebel cartridges)

Dimensional Action Specifications

Weight (five-shot model)	... 51 oz.
Receiver length	... 8.50"
Receiver ring dia.	... 1.265"
Bolt dia.	... .720"
Bolt travel	... 4.450"
Striker travel	... .50"
Magazine well opening:	
Length	... 3.065"
Width, rear	... .895"
Width, front	... .395"
Bolt face recess:	
Dia.	... .635"
Depth	... .072"

General Specifications

Type	... Turnbolt repeater.
Receiver	... One-piece machined steel forging, slotted bridge. One-piece stock.
Bolt	... Two-piece, dual-opposed forward locking lugs on separate bolt head. Base of the bolt handle is safety lug.
Ignition	... One-piece firing pin powered by coil mainspring. Cocks on opening bolt.
Magazine	... Single-column non-detachable box magazine. Special clip required. Three- or five-shot capacity.
Trigger	... Non-adjustable, double-stage military pull.
Safety	... None provided.
Extractor	... One-piece spring type mortised into bolt head.
Magazine cutoff	... None provided.
Bolt-stop	... No separate bolt-stop; see text.
Ejector	... Stud type, made as integral part of trigger.

The 8mm Lebel Cartridge

This cartridge was the first relatively small-bore smokeless powder rifle cartridge to be adopted by a world power. In doing so, France led other countries by about two years. The 8mm Lebel cartridge is based on a rimmed, bottlenecked case, with the case body having a double taper. Although origi-

nally loaded with a full-jacketed flat-nosed bullet, for use in the tubular magazine Lebel rifle, in 1898 it became the first military cartridge loaded with a spitzer-point boattail bullet.

During WW I, Remington contracted with France to make both rifles and ammunition. As a result of contract cancellations after the war, a great many of these rifles remained in

the United States and were sold on the commercial market. Remington then loaded sporting ammunition for these rifles until about 1964. Remington loaded 8mm Lebel sporting ammo with a 170-grain softpoint bullet to a muzzle velocity of 2640 fps. At 200 yards the velocity is 1960 fps, remaining energy 1450 foot pounds, while midrange trajectory over this range is 3.4". This com-

French Model 1936 MAS rifle chambered for the 7.5mm French cartridge. Like the Lebel, this rifle has a two-piece stock.



compares favorably with such more popular cartridges as 30-40, 303 British, 300 Savage and 8mm Mauser. Regardless of what I said about the French rifles chambered for the 8mm Lebel cartridge (to my knowledge no other rifles were so chambered), it is a good load.

The number of models, variations and transformations of rifles and carbines based on the Berthier action are too many to list here. Starting with the very old Gras action, we have seen how France used this basic turnbolt system with various types of magazines of Kropatschek, Lebel and Berthier designs. This brings us to the last version, a turnbolt action fitted with a Mauser-type staggered-column magazine. These rifles (there are about three different variations) are known as the French Model 1934.

is held closed by a spring-loaded plunger—like the M98 Mauser. The magazine well opening in the receiver was milled so integral cartridge guide lips remain—also like the Mauser system. A follower, with a rib on one side and set on a W-shaped follower spring, completed the magazine. Notches were then milled in the front of the receiver bridge slot to accept a stripper clip—so the magazine could be loaded quickly. Other necessary things were done with the action to handle the 7.5mm cartridge. The barrel and action were set into a one-piece stock, and the result was the Model 1934—the year in which it was adopted.

The outside appearance of the M34 is not too unlike the three-shot Berthier, except that it does not have quite as much belly. At best, the new rifle was only a makeshift stop-gap



French M1936 MAS action.

The Model 1934 French Rifle

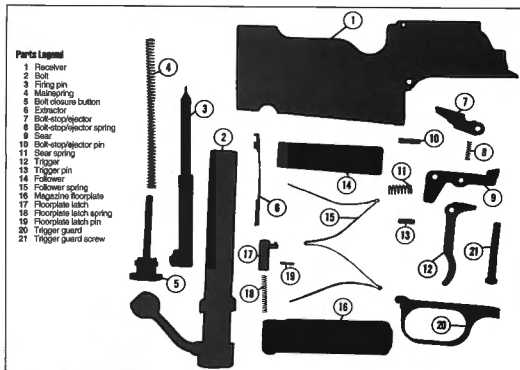
I have to backtrack a bit here. In 1929, France developed a modern rimless military cartridge for light machine gun use—it was difficult to make or adapt any machine gun to handle the rimmed 8mm Lebel cartridge. The new cartridge, a rimless, bottlenecked case loaded with a 7.5mm bullet, is known as the 7.5mm French M1929C, 7.5x54mm French MAS or as the 7.5mm MAS. It was almost impossible to use the old 8mm Lebel cartridge in anything but a tubular or single-column magazine and, since the prospects for continued peace looked poor, the French officials decided to adapt the Model 1907/15 rifle (a Berthier variation) to this new cartridge.

This was done by fitting the old receiver with a box magazine wide enough to hold a staggered-column of five 7.5mm cartridges. The bottom of the magazine box has a detachable floorplate which fits in place and

affair, practically obsolete before it was made. Probably not too many M34s were made—they are rare in the U.S., hence of considerable interest to the collector.

The MAS Model 1936

A year or so after the 7.5mm French cartridge was introduced, French ordnance began to develop a new shoulder arm for it. Discarding all previous turnbolt rifle designs, they devised an entirely new action system in 1932, and that rifle is the MAS M-1932. A limited number of M32s were made for testing, and after four years (with a number of modifications) the final version was approved and adopted as the MAS Model 1936. The development work was done in France's largest arms making city, St. Etienne, by the Manufacture d'Armes St. Etienne, of which "MAS" is an abbreviation. It was the latest and the best military bolt-action rifle adopted and made by France.



Parts Legend

- 1 Receiver
- 2 Bolt
- 3 Firing pin
- 4 Mainspring
- 5 Bolt closure button
- 6 Extractor
- 7 Bolt-stop/ejector
- 8 Bolt-stop/ejector spring
- 9 Sear
- 10 Bolt-stop/ejector pin
- 11 Sear spring
- 12 Trigger
- 13 Trigger pin
- 14 Follower
- 15 Follower spring
- 16 Magazine floorplate
- 17 Floorplate latch
- 18 Floorplate latch spring
- 19 Floorplate latch pin
- 20 Trigger guard
- 21 Trigger guard screw

French MAS Model 1936
(Uses French 7.5mm cartridges)

Dimensional Action Specifications

Weight	.51 oz.
Receiver length	7.75"
Receiver width	1.385"
Bolt dia.	.800"
Bolt travel	3.485"
Striker travel	.550"
Magazine well opening:	
Length	3.10"
Width (average)	.550"
Bolt face recess:	
Dia.	.485"
Depth	.090"

General Specifications

Type	Turn-bolt repeater.
Receiver	One-piece, machined steel forging with integral magazine box. Non-slotted bridge. Two-piece stock.
Bolt	One-piece, with dual-opposed locking lugs at rear. No safety lug.
Ignition	One-piece hollow striker powered by coil mainspring. Cocks on opening bolt.
Magazine	Staggered-column box magazine made integral with receiver. Five-shot capacity. Quick-detachable floorplate. Non-adjustable double-stage military pull.
Trigger	None provided.
Safety	None provided.
Extractor	One-piece flat spring extractor mortised into bolt.
Magazine cutoff	None provided.
Bolt-stop	Pivoting type engages in groove at bottom of bolt.
Ejector	Pivoting type integral with bolt-stop.

The MAS M36 rifle weighs about 8.25 pounds, has a 22.6" round, stepped barrel and is 49.13" overall. The buttstock, held in place by a single screw, is very short. The distance from buttplate to trigger is only 12.62". A separate forend (extending to within 5" of the muzzle) and the full-length wooden handguard are held to the barrel by two bands. A metal hook, attached to the rear of the forend, engages in a recess at the front of the receiver and holds the forend

assembly against the receiver. The M36 is fitted with a skewer-type bayonet carried reversed in a tube within the forend under the barrel. The leather carrying sling is attached to the left side of the rifle on a bar on the buttstock and on a loop on the middle barrel band. The aperture rear sight, mounted on the receiver bridge, is adjustable for elevation only—from 200 to 1200 meters.

The only variation of this rifle is the paratroop model, designated the MAS Model 1936 CR39 rifle. This model has a folding aluminum stock, hinged just forward of the trigger. When unlatched, it can be swung under and to the left of the forend. It weighs about 8 pounds. Both rifles are chambered for the 7.5mm French cartridge.



French M1936 MAS action, open.

The M1936 Action

The receiver of the French Model 1936 rifle is a box-like affair, or housing, with the entire magazine box made as an integral part of the steel forging. The magazine housing extends to the front of the receiver and is hollow forward of the front magazine wall. There is no receiver ring as such; the receiver housing is bored and threaded to receive the barrel shank instead. There is a complete ring of steel in the receiver against which the breech end of the barrel butts, and which surrounds the head of the bolt when it is closed. The ring is about $1/4$ " wide and the bolt is enclosed to this depth.

The loading/ejection port begins at the rear of this ring and extends to the receiver bridge—an opening 2.925" long. When the bolt is open the breech end of the barrel and the chamber are clearly visible. The right side of the ejection port is cut down to the level of the cartridge guide lip of the magazine well, while the left side is cut slightly below the level of the top of the bolt, leaving a wall about $1/2$ " high. A thumb notch is cut into the rear of this left wall to aid in stripping cartridges from a clip when loading the rifle. Because the bolt diameter is quite large, the loading/ejection port is also, but this is not at all objectionable.

The receiver bridge, about 2.60" long, is unslotted. An integral raised strip is milled on top of the bridge to form a housing for the rear sight components. At the front of the receiver bridge is the clip charger guide.

The one-piece bolt, very rugged, is also

quite large in diameter; .800" as compared to the Mauser and Springfield .700", and the Mark V Weatherby .840". The front of the bolt is recessed for the cartridge head. The only break in the recess is the narrow ejector slot and the cut for the extractor, about .320" wide. The extractor, made of spring steel, and about 2.80" long, is mortised and dovetailed into the bolt body. It has a sturdy beveled hook which easily slips over and engages the extractor groove in the cartridge head. A small round stud under the front of the extractor fits into a matching hole in the bolt; this prevents longitudinal movement of the extractor in the bolt.

The solid, dual-opposed locking lugs, about 1.75" from the rear of the bolt body, engage in dual raceways and shoulders milled inside the heavy receiver bridge. The raceways are inclined on the shoulder approaches and provides camming action to draw the bolt forward as the bolt is closed and the handle is turned down.

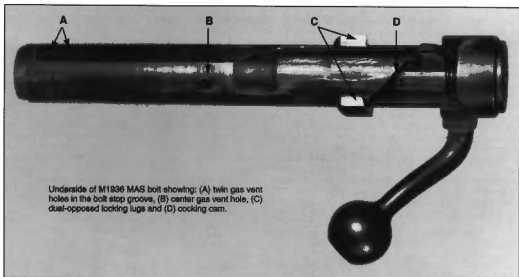
The bolt handle is an integral part of a collar at the rear of the bolt—the collar is also part of the bolt. The bolt handle stem is round and tapers to the round, hollow grasping ball—the stem is bent forward and down. When the bolt is closed, the collar closes all openings at the rear of the receiver. A raised portion on the collar is beveled to match a similar surface on the left rear of the receiver, and provides the initial extraction power on raising the bolt handle. On moving the bolt forward to close the action, these surfaces impart initial turning motion to the bolt.

The bolt is drilled from the rear to accept the one-piece hollow firing pin. The collar at the rear of the bolt is milled to accept the bolt closure button. This button has two lugs, and the inside of the collar is milled leaving shoulders and recesses so the button is locked in place when it is rotated after insertion. There is a rod projecting forward out of the bolt button and the small coil mainspring is compressed over this rod as it extends into the hollow firing pin.

The rear underside of the bolt body, just forward of the bolt collar, is milled to form a cocking cam surface. The cocking cam on the rear of the firing pin fits into this notch. The cocking cam extends below the bolt body into a groove cut into the receiver, and has a notch to engage the sear. On raising the bolt handle, the firing pin is forced back until the cocking cam slips onto a flat spot on the end of the camming surface. On closing the bolt, the sear engages the cocking cam and holds the firing pin back as the bolt is fully closed and locked.

The sear is positioned in a groove below the receiver bridge and is held in place by, and pivots on a pin. Tension is provided by a stiff coil spring. A projection on the rear of the sear protrudes through a hole in the receiver to engage the cocking cam of the firing pin. The trigger is pivoted on a pin in the sear.

The combination bolt-stop/ejector fits partially inside the sear, partially over the trigger, and pivots on the pin with the trigger. The front of the bolt-stop/ejector projects upward through a hole in the receiver and is provided upward tension by a small coil spring be-



Underside of M1936 MAS bolt showing: (A) twin gas vent holes in the bolt stop groove, (B) center gas vent hole, (C) dual-opposed locking lugs and (D) cocking cam.

tween it and the sear. A narrow inclined groove is cut into the bottom of the bolt, extending into the bolt face recess for the narrow ejector. A wider groove is cut beside it for the bolt-stop, but this groove ends abruptly about $1/4$ " from the head of the bolt. The bolt-stop is released (to remove the bolt) by pulling the trigger back as far as it will go. The bolt-stop/ejector, riding in the grooves, also acts as a bolt guide when the bolt is operated and prevents the bolt from turning as it is drawn back.

Two gas vent holes in the front of the bolt-stop groove effectively take care of any gases that enter the firing pin hole by venting them rearward through the thumb notch in the left receiver wall. If this is not enough, there is another hole, in about the center of the bolt, to vent any gases getting back this far into the magazine. The firing pin, bolt and bolt button are constructed to make gas escape impossible through the rear of the bolt. There is no danger of the firing pin or button ever being blown out of the bolt.

The trigger guard bow is a separate part and a hook at the front engages a groove in the rear wall of the magazine box. The buttstock is clamped between the trigger guard bow and receiver by the guard screw threading into the receiver tang. The rear of the magazine housing is hollowed out slightly, and the tenon on the front of the buttstock fits into this hollow to help secure the stock to the receiver and prevent it from splitting.

As mentioned before, the four walls of the magazine box are an integral part of the receiver housing. The walls are quite thick

(about .090") and reinforced in spots. A machined, hollow floorplate fits in the bottom of the magazine box. It is held in place by a lip at the rear of the plate engaging in a groove in the magazine box and by a push-button latch on the front engaging in a groove at the front of the right magazine wall. A conventional steel follower and W-shaped follower spring are used. The ends of the spring are mortised into the follower and floorplate.

Operation

The MAS M36 rifle operates like most other staggered-column box magazine bolt-action rifles. The bolt handle is raised and drawn back to open the action. With the bolt open, the magazine is loaded by pressing single cartridges directly into the magazine, or placing a loaded stripper clip in the clip-charger and pressing the cartridges into the magazine. The bolt is then pushed forward, feeding the topmost cartridge from the magazine into the chamber. Turning the bolt handle down locks the cartridge in the chamber. The action is left cocked when the bolt handle is turned down, and pulling the trigger will release the firing pin to discharge the cartridge. The rifle cannot be fired unless the bolt handle is nearly all the way down and the bolt locked. On opening the bolt the fired case will be extracted and ejected from the action—the cycle can then be repeated. The rear of the follower is beveled and does not prevent the bolt from closing when the magazine is empty. The magazine can be unloaded by removing the floorplate. There is

no safety, but the bolt handle fully raised makes an effective safety.

Takedown and Assembly

Make sure the chamber and magazine are empty. Remove the buttstock by turning out the trigger guard screw. Pull the trigger guard from the stock and away from the receiver, and pull the stock back and down from the receiver. Remove the forend and handguard by turning the cross screw out of the front barrel band and pulling the band forward. Turn out the screw from the middle barrel band and remove it, then lift off the forend and handguard. Reassemble in reverse order.

Remove the bolt by raising the bolt handle and drawing the bolt to the rear as far as it will go; pull the trigger back all the way and then remove the bolt. To disassemble the bolt, grasp it in the left hand and, with the right thumb, depress the bolt button and turn it clockwise $1/4$ -turn or until it snaps out. The bolt button, mainspring and firing pin can then be removed from the bolt. Reassemble as follows: insert the firing pin in the bolt with the cocking cam lug resting on the flat spot of the cocking cam. Insert the mainspring and bolt button, aligning the left index mark on the bolt button with the index mark on the bolt. Press the button all the way into the bolt or until it can be rotated counterclockwise $1/4$ -turn.

The extractor can be removed using a screwdriver and lifting its front end up, away from the bolt, until the extractor can be pulled forward and out of the bolt. Reassemble in reverse order.

PART I: Military Rifles & Actions

Depress the button on the right front of the floorplate and pull it, along with the spring and follower, from the magazine box. The follower and floorplate can then be pulled off the ends of the follower spring. In reassembling, the narrow end of the follower spring goes into the follower. To remove the floorplate latch and spring, drive the small latch retainer pin from the floorplate.

Remove the trigger assembly by driving out the sear pin, then pull down on the rear of the sear until it is free of the receiver. The trigger pin can then be driven out to separate trigger, bolt-stop/ejector and bolt-stop/ejector spring from the sear. Reassemble in reverse order.

The barrel is threaded (right-hand threads) tightly into the receiver and it should not be removed unless necessary, and then only if you have the proper tools.

Markings

The French MAS Model 1936 rifles are boldly marked with the designation MAS M¹⁹ 1936 stamped on the left side of the receiver. The serial number is stamped below the designation marking, as well as on the floorplate and on the stem of the bolt handle. Various French proofmarks and inspector's marks are stamped on the receiver ring and the breech end of the barrel.

Comments

I have gone to some length describing the MAS Model 1936 rifle and action because I think this action is most interesting and unusual. To be sure, this action has some faults, but it also has some excellent features worthy of comment and consideration.

It appears to be a very strong action. The two locking lugs are solid and massive. There is a lot of metal in the receiver bridge to support the lugs when the bolt is locked and

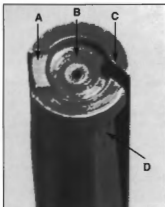
there is no chance that these supporting shoulders will fail. Though the left side wall of the receiver has a thumb notch, there is ample metal connecting the receiver bridge to the ring. The receiver is strengthened further by the ridge of metal along each side and by the heavy walled integral magazine. There is little chance of the receiver parting in the middle even though the locking lugs are at the rear of the bolt. I cannot see how the receiver could "stretch," and the very heavy bolt is certainly not going to compress when firing the rifle. For many years, the prevailing opinion has been that only a bolt action with at least two forward locking lugs is worth considering. If we consider the success of the fine Schultz & Larsen action, the Remington Model 788, the Steyr-Mannlicher SL and others with locking lugs at the rear of the bolt, then I can see nothing wrong with the MAS design. The MAS design also results in a shorter bolt travel (the reader may want to compare the action specifications in this book), and this may aid in speed of operation. An important result of this design is that the cartridges do not span any gap between the magazine and chamber, the resultant feeding being more positive and reliable.

I believe the MAS M36 is also a very safe action because the front of the bolt is surrounded by a solid ring of steel when the bolt is locked, the bolt face nearly contacts the barrel, and the rim of the cartridge is almost fully enclosed; the rear of the bolt is entirely closed so that gases can't escape.

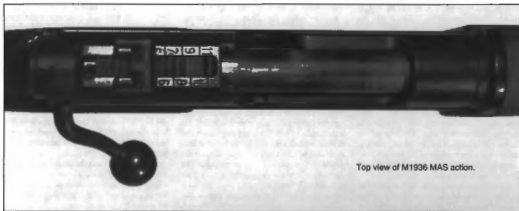
The bolt of the MAS is relatively short and the long receiver bridge gives considerable support resulting in little "play" or looseness of the bolt when the action is open. On the few rifles I have examined and handled, bolt operation was easy and smooth. I noticed too, that the actions were generally very well made and finished. I especially like the

extractor of this action. It is simple and strong—modern designers of turnbolt actions might do well to copy it. I certainly would consider it better than some purely modern rifle extractors like those of the Remington M700 and Weatherby actions.

As for the magazine box being made as part of the receiver, I have not decided whether I like this or not. The same goes for the two-piece stock design imposed by the "housing" type receiver. However, I have always admired the Model 99 Savage rifle with its exposed receiver, and I do not believe I'd mind the exposed MAS M36 receiver on a sporting rifle. To my way of thinking this receiver has rather nice lines, including those where the buttstock contacts the receiver. I like the magazine floorplate and the way it is

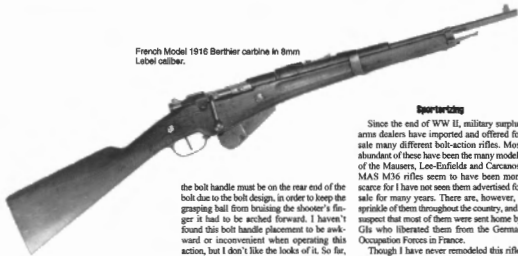


Bolt head of the M1936 MAS showing: (A) extractor, (B) cartridge head recess, (C) ejector slot and (D) bolt stop notch.



Top view of M1936 MAS action.

French Model 1916 Berthier carbine in 8mm
Label caliber.



released, although I'd rather have the floor-plate fitted so it would be flush with the bottom of the magazine box.

I found the box magazine to be a marvel the way it will accept and feed a wide variety of cartridges. It will only handle cartridges about 3.0" in overall length, but many cartridges fall within these limits. For example, it will feed perfectly such cartridges as the 22-250, 25-3000, 243, 6mm, 257 Roberts, 7mm, 284, 308, 35 Remington and 358. All of these cartridges have a smaller rim diameter than the 7.5mm French cartridges and this would require that the rim recess in the bolt might have to be reduced in some manner, and the claw of the extractor made longer.

The MAS M36 is an astonishingly simple action with a minimum of parts—fewer than any other high-powered turnbolt repeater of which I am aware. For example, this action has twelve fewer component parts than the M98 Mauser, which has fewer parts than the 03 Springfield. The entire M36 bolt assembly consists of just five parts; bolt, extractor, firing pin, mainspring and bolt button. An action that has few parts is not always an indication it is good, but like any piece of machinery, fewer parts lessen the chance for breakdown.

This action has no safety and that may be a strike against it—depending on one's viewpoint. I can't see how a safety could be incorporated in the bolt to lock both the bolt and firing pin, but a simple safety could be built into the trigger guard to lock the trigger.

There is one thing I do not like about this action—the bolt handle. To keep the action and the rifle as compact as possible, the trigger and trigger guard were positioned well under the receiver bridge. Since the base of

the bolt handle must be on the rear end of the bolt due to the bolt design, in order to keep the grasping ball from bruising the shooter's finger it had to be arched forward. I haven't found this bolt handle placement to be awkward or inconvenient when operating this action, but I don't like the looks of it. So far, I'm still not used to the looks of the forward-bent bolt handles on the 600 Remington and 800 Mossberg rifles, but like the MAS M36, one should not mind the looks of the handle if the bolt is convenient to operate and is out of the way of the trigger finger.

7.5mm MAS and Recambering

As previously mentioned, the 7.5mm French MAS (7.5x54mm) cartridge was introduced in 1929. It is a rimless bottlenecked cartridge nearly identical in appearance and ballistics to the 308 Winchester or 7.62mm NATO cartridges. The 7.5 indicates the caliber and bore diameter, which is .295", and 54 indicates a case length of 2.12". The overall length of the cartridge is about 3.00". The standard military ball loading drives the 139-grain jacketed pointed bullet of .307" diameter at a muzzle velocity of 2674 fps.

The above figures for the bore and bullet diameter show that the cartridge is very close to being a 30-caliber like our 308 and 30-06 which have a normal bore size of .300", and normally use .308" bullets. The groove diameter of the 7.5mm MAS barrel runs about .3075" to .3085", and has a rifling twist of one turn in 10". In handloading this cartridge, regular .308" jacketed bullets can be used.

The 7.5mm MAS cartridge was loaded only for military use and was Berdan primed. The problem presented to the handloader is that the 7.5mm case is an odd size, having a head diameter of about .481" compared to the .470" for the 30-06 case. The 7.5 MAS ammunition has always been very hard to obtain. I have heard that the best cartridge case to use in handloading the ammunition is the 6.5x55mm. However, I cannot vouch for this because I have never tried it.

Sporting

Since the end of WW II, military surplus arms dealers have imported and offered for sale many different bolt-action rifles. Most abundant of these have been the many models of the Mausers, Lee-Enfields and Carcanos. MAS M36 rifles seem to have been more scarce for I have not seen them advertised for sale for many years. There are, however, a sprinkle of them throughout the country, and I suspect that most of them were sent home by GIs who liberated them from the German Occupation Forces in France.

Though I have never remodeled this rifle, and probably never will, if I had one in the days when I did much remodeling and rifle building, I probably would have approached the job with great enthusiasm. This is what I would have done: I'd replace the barrel with one 22" of sporter weight chambered for 257 Roberts or 7mm Mauser; fit a tapered forend of the Model 99 Savage rifle pattern; remove the military rear sight and base from the receiver and install a Lyman or Redfield receiver sight and a ramp front sight on the barrel, or mount a scope on the receiver using a Buehler blank base. I'd weld a strip to the front of the trigger guard to move it about 1" farther to the rear and make a similar tang extension on the receiver for the guard screw; the trigger would be altered, positioning it to the rear in the relocated trigger guard. A crossbolt safety in the rear of the trigger guard would lock the trigger and a new buttstock with a capped pistol grip and panels forward of the grip like the Model 99 Savage stock. With the trigger, trigger guard and grip located farther back on the action, I would then bend the bolt handle down, and shorten its stem to place the grasping ball within easy reach. Finally, I'd polish and blue the metal parts, jewel the bolt and checker the grip and forend.

In my search for information about the MAS M36, I came across an item written by a well-known gun authority stating that Manufacture d'Armes had made a sporting rifle on the M36 action. According to him these were made in 7x57mm, 8x60mm Magnum and 10.75x68mm. The last two cartridges are longer than the magazine opening of the military action, therefore, the sporter action must have had a longer box. A safety was also provided in the trigger guard.



German Model 88 Commission Rifle

THE GERMAN MODEL 88 rifle, adopted in 1888 and correctly known as the German Commission Model 88, was the official German military rifle until succeeded by the famous Model 98 Mauser in 1898. The M71 Mauser single shot and the M71/84 Mauser repeater, both in 11mm caliber, preceded the M88 as the official German military shoulder arms.

The 88 rifle was developed by a group of men, headquartered in Spandau, Germany, who formed the German Military Rifle Testing Commission, thus its unusual name. Although it has some features taken from earlier Mauser and Mannlicher rifles, it is neither a "Mauser" nor a "Mannlicher." A well-planned and thought out rifle, the main features of the receiver and bolt were used long afterward on the Mannlicher-Schoenauer sporting rifles.

Developed with the M88 rifle was Germany's first small-caliber smokeless military cartridge. It was a bottle-necked, rimless cartridge of 8mm caliber, and the forerunner of the world famous 8x57 Mauser cartridge.

Vast quantities of M88 Commission rifles and carbines were made in various German government armories. These rifles were usually marked "GEW.88" stamped on the left side of the receiver. "GEW" is an abbreviation of the German word *Gewehr*, meaning rifle. The rifles had a 29.1" barrel, the carbines with a 17.62" barrel; the receivers were usually marked "KAR.88." "KAR." is an abbreviation for *Karabiner*, meaning carbine. Both the rifle and carbine were made with a barrel jacket, a thin-walled steel tube covering the entire length of the barrel. The jacket is large enough to leave an air space between the jacket and barrel. The carbine has a turned-down spoon-shaped bolt handle, while the rifle has a straight bolt handle with a round grasping ball. A great many of these arms were also made in plants in Austria, including the great Steyr works.

As these rifles became obsolete, many of them turned up in the United States. During

the 1920s and '30s, the M88 Carbine was especially common, many of them used "as issued" for hunting big game.

Action Construction

The receiver is milled from a one-piece steel forging. The receiver ring is round except for a very small projection underneath which forms the recoil lug. The small recoil lug required that a square-stemmed cross-bolt be used in the stock—the recoil lug engaging a groove milled into the cross-bolt. A longer projection at the bottom rear of the receiver ring forms the cartridge guide. The front of the receiver is threaded on the outside for the barrel jacket collar and on the inside for the barrel shank. The breech end of the barrel abuts against two semi-circular shoulders milled inside the receiver ring; these shoulders partially ring the bolt head. To the rear of these shoulders, the inside of the receiver is milled out to receive the locking lugs of the bolt.

The rear part of the receiver, commonly called the bridge, is slotted on top so that the bolt handle can pass through it when opening and closing the action. A simple bolt stop is positioned on the left side of the receiver bridge and hinged there by a pin through a stud on the receiver. Tension is provided to the bolt stop by a small coil spring.

The bolt assembly is comprised of the bolt body with its integral handle, bolt head assembly and firing mechanism. The bolt body is a cylindrical, hollow tube drilled from front to rear. The opposed dual locking lugs are on the extreme forward end of the bolt body and engage matching recesses in the receiver when the bolt is closed.

The left (or top) locking lug has a narrow slot cut through it. This allows the bolt to pass over a finger on the end of the bolt stop—this finger activates the ejector when the bolt is opened. The right (or bottom) locking lug is solid with its top front corner beveled to match a similar bevel machined on the top

shoulder inside the receiver ring. This provides the initial extraction camming power on opening the bolt.

The separate bolt head is made to fit closely on and inside the front end of the bolt body. A small lug on the stem of the bolt head fits in a matching circular recess cut inside the bolt body to hold the two parts together, except when the bolt head is rotated to a certain position. The small spring extractor is mortised into a groove in the right side of the bolt head. The extractor easily snaps over the cartridge rim when the bolt is closed on a cartridge singly loaded into the chamber, or on a cartridge that is chambered from the magazine ahead of the extractor. A lug on the left of the bolt head matches the left locking lug on the bolt and contains the very small ejector. On some bolt heads, the ejector is held in place by a small screw, while on others friction alone holds it in place when the bolt head is disassembled from the bolt body. The end of the ejector protrudes through a hole in the face of the bolt head recess. The face of the bolt head is recessed for the cartridge head. On some bolt heads, the rim of the recess covers about 75 percent of the circumference of the cartridge head. On others, the rim is not cut away at all—except for the extractor cut. The bolt head does not rotate with the bolt. It is prevented from doing so by the flattened end of the firing pin fitted into its slotted stem.

The rear end of the bolt has a hole that is smaller than the main hole through the bolt body. The mainspring is compressed between the shoulder formed by the smaller hole and the shoulder on the front of the firing pin.

The threaded rear end of the firing pin extends through the center of the cocking piece and is retained there by the firing pin nut. A flat spot on the rear of the unfired

(Pictured above) M88 (KAR.88) German Commission carbine.



German M88 (GEW.88)
Commission rifle.



Close-up of the M88 German Commission rifle action.

part of the firing pin matches a flat surface inside the cocking piece and prevents the firing pin from turning. A notch in the front of the firing pin nut engages the rear end of the safety when it is turned tight—to prevent the nut from coming loose. The rear, flared part of the firing pin nut has a narrow flange extending into the cocking cam raceway of the receiver and a wide flange, the size of the locking lug raceway, extending to the left. Their purpose is to deflect powder gases away from the shooter's face—in the event of a ruptured primer or case head.

The rear end of the bolt body has a deep cam notch to engage the cam on the front of the cocking piece. When the bolt handle is lifted, the cocking piece is cammed back about 370°—the remaining cocking motion is done on closing the bolt. Essentially, the M88 is a "cock-on-opening" action, since the greatest amount of cocking is done when the bolt is opened. This action can be uncocked without snapping by closing the bolt while holding the trigger back. *This should only be done on an empty chamber.*

The wing safety fits into a hole bored longitudinally in the top part of the cocking piece. It is held in place by the firing pin nut. A small coil spring around the safety stems holds the safety back against the firing pin nut to prevent the nut from turning, yet allows the safety to be pushed forward so the nut can be unscrewed. It also provides tension to the safety so it will remain in the position to which it is rotated.

Rotating the safety to the "up" or "right" position, its forward end engages a notch cut into the rear of the bolt body, camming the cocking piece back slightly so it is free of the main sear and, at the same time, locking the bolt so it cannot be opened. Since the safety, safety spring, cocking piece, firing pin nut and firing pin are assembled as a unit, they all move as a unit when the action is cocked and fired.

The trigger assembly is a simple one, composed of a trigger, sear housing, sear trigger spring, trigger pin, sear pin and sear housing pin. The sear housing pin holds the assembly to the receiver. The trigger is the double-stage type. The first part of the trigger pull, quite

long and light, nearly disengages the sear from the cocking piece. A shorter, but heavier, final pull disengages the sear from the cocking piece.

The trigger guard/magazine is machined and formed as a single unit. A long screw, through a hole in the rear of the trigger guard, threads into the tang of the receiver. A shorter screw, through a hole in the front of the guard, threads into a round stud, silver soldered to the barrel jacket. Both hold the action and barrel in the stock.

The trigger guard bow opening is long—the bow itself is very thick and wide. The magazine box, more or less a walled shell, extends below the stock line, forward of the guard bow, housing the various magazine parts which hold and guide the cartridge clip. It is essential that a clip be used in this action, since it is the clip that holds the cartridges in position in the magazine. I will go into more detail later.

A catch, which pivots on a screw and is given tension by a small coil spring, is positioned in the rear of the magazine. This catch has a hook on its upper end to engage and hold the loaded clip down. A button on the lower end of the catch protrudes inside the guard bow and can be depressed to release the loaded clip. The follower arm, positioned in the front of the magazine on a screw, is given tension by a heavy coil spring and plunger, located in a hole in the heavy front part of the magazine. The rear underside of the magazine is open to allow the empty clip to fall out. The remainder of the magazine opening is closed by a flat piece of steel, held in place by a screw.

The clip is a U-shaped piece of spring steel which holds five cartridges. The top and bottom of the clip are identical. The edges of the side are curved inward to hold the cartridges and to form guide or retainer lips when the loaded clip is in the action. Ridges inside the rear of the clip match the extractor groove in the cartridge head. When loading the cartridges into the clip they must be inserted with their heads engaged behind these ridges. The ridges thus hold the cartridges securely in the clip, and the rifle's recoil cannot dislodge the cartridges forward from the clip. This clip



Two types of bolt heads used in M88 Commission rifles. Top: Bolt head with the wide extractor hook and undercut recess rim. When feeding from the magazine into the chamber, the cartridge head moves upward with the extractor hook engaging the cartridge. If the bolt is closed but not rotated and locked, the cartridge will be extracted and ejected on opening the bolt. Bottom: This is, perhaps, the earlier type of bolt head with the narrow extractor and a full-recess rim. The cartridge is pushed into the chamber ahead of the extractor, but the extractor hook cannot engage the cartridge head unless the bolt is fully closed and locked. With this bolt head, it is possible to "double load" the rifle. Unless the bolt is rotated and locked, the cartridge will not be extracted.

form is of some advantage when soft point ammunition is used, as it will keep the bullet point from being battered—by striking the front of the magazine from recoil.

The loaded clip is inserted into the top of the opened action and pushed down against the tension of the follower arm until engaged by the clip catch. Since the top and bottom of the clip are identical, it isn't possible to insert the clip incorrectly. As each cartridge is fed out of the clip, the follower arm raises the remaining cartridges in the clip—the clip remaining stationary. A fully or partially loaded clip can be released from the top of the opened action by depressing the clip catch. When all the cartridges have been fed from the clip, it will drop from the magazine of its own weight.

Military M88s are usually serial numbered. The full number is stamped on the receiver, barrel, barrel jacket and bolt. Other parts of the action may also be stamped with the same number or with part of that number. If all the numbers match, this indicates that all the parts are original. The date (year) of the rifle's manufacture is usually stamped on the receiver ring. Commercial sporting rifles based on this action usually follow the serial numbering practice used on military arms, though they are not always stamped with the date of manufacture. Military rifles seldom have the caliber designation stamped on them. On sporting rifles, the caliber is usually stamped on the barrel, but it may be underneath the barrel, requiring the removal of the stock to see it.

Strong and Weak Points

The German M88 actions are well made, all the parts are of steel, machined and finished to close tolerances and properly heat-treated. The outside of the bolt body, the inside of the receiver and all the contacting surfaces of the firing mechanism within the bolt and receiver carry a very fine finish, resulting in exceptionally smooth and easy opening and closing of the bolt. Despite the

slotted receiver bridge, there is little sloppiness of the bolt in the receiver, even when the bolt is open. Feeding of the cartridges from the magazine is smooth and reliable, and there is ample extraction ejection power. The bolt stop is quite rugged; the safety positive. Although the bolt head is a separate part of the bolt, and the front end of the bolt is hollowed out to accept it, there seems to be ample metal at the front to adequately support the dual locking lugs.

This action, however, has more weak and undesirable features than strong ones. The weakest part is the very small extractor. Not only is it weak and delicate, but it can be lost easily when the bolt is taken apart. The ejector is small and delicate also.

The separate bolt head can be readily disassembled and can be easily lost—another undesirable feature. The bolt can be assembled in the action minus the bolt head, and it is possible to fire a cartridge in the rifle with the bolt head missing with unpredictable consequences.

The worst feature is the need for a special clip to hold the cartridges in the magazine. When the M88 rifle was used as a military weapon, with the ammunition supplied in clips, these clips were then expendable. However, when these rifles were used as sporting arms, the sporting ammunition was not furnished in clips, and their easy loss became a problem. A small device known as a "clip-saver" was developed to prevent the clips from dropping from the magazine. It was a small, sliding spring cover slipped over the rounded edges of the bottom of the magazine. Covering the hole in the magazine held the empty clip in the magazine. Commercial sporting rifles made on this action often had a hinged magazine hole cover serving the same purpose.

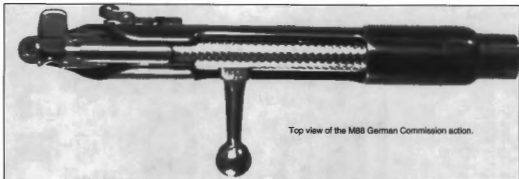
Another undesirable feature is the mass of metal attached to the striker, resulting in rather slow lock time. This mass includes the heavy striker, massive cocking piece, striker nut, safety, and safety spring.

No provision is made to allow powder gases to escape harmlessly from the action in the event of a pierced primer or ruptured case head. There are no gas escape vents in the bolt or receiver ring.

Minor design faults include the forward position of the bolt handle, inconveniently placed for rapid bolt operation. The split bridge design prevents installing a conventional receiver sight and also places some limitations on the choice of scope mounts which can be used. The magazine box extending below the stock line is also a nuisance in carrying the rifle. Although not an action fault, the barrel jacket is not a desirable feature.

Takedown and Assembly

Open the bolt and, while depressing the bolt stop, withdraw the bolt from the receiver. Disassemble the bolt as follows: Press the safety forward and unscrew the striker nut. Remove the cocking piece from the firing pin. Holding the bolt in the left hand, firmly grasp the bolt head with the fingers of the right hand and turn the bolt head 1/2-turn clockwise. Bolt head, firing pin and mainspring can now be pulled out of the bolt. The extractor is removed from the bolt head by raising the hooked end and sliding it forward. The ejector can be removed by pushing it back with a drift punch. Reassemble the bolt parts in reverse order, as follows: Lay the bolt on a table with the lugs to the right and the bolt handle toward you. Place the bolt head on the firing pin with the ejector lug aligned with the flat spot on the rear of the firing pin. Slip the mainspring over the firing pin. Now, grasp the bolt with the left hand and, with the bolt handle pointing toward you, insert mainspring, firing pin and bolt head into the front of the bolt. With the ejector lug pointing away from you, or opposite the bolt handle, push the bolt head into the bolt as far as it goes; then turn the bolt head 1/4-turn counterclockwise so the ejector lug is aligned with the left locking lug. Place the cocking piece



Top view of the M88 German Commission action.

over the rear end of the firing pin, with the safety lug in line with the bolt handle. Insert the safety and spring into place with the safety wing to the left and, while depressing the safety, turn on the striker nut until the rear end of the firing pin is flush with the end of the nut.

Remove the barrel, action and magazine assembly from the stock by removing the front and rear guard screws from the bottom of the magazine/guard. Remove the bolt stop by driving out the bolt stop pin from the bottom. Remove the trigger assembly by driving out the trigger sear pin. Depress the follower arm and insert a wire or brad into the hole exposed at the end of the follower plunger. Then remove the follower screw to remove the follower. Remove the magazine plate screw and slide out the magazine plate. Remove the clip catch screw and remove the catch and spring. Pull out the wire or brad from the follower plunger to move the plunger and spring. Reassemble in reverse order. Do not unscrew the barrel jacket or bar-

rel from the receiver unless you have the proper tools available.

Remodeling

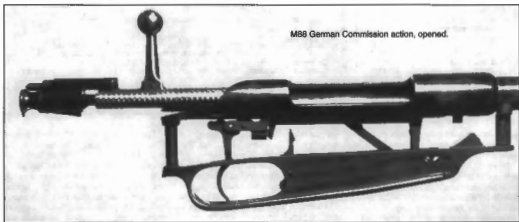
As soon as the M88 rifle had been adopted, German and other European gunmakers began making sporting rifles on this action. The practice continued long after the M88 was dropped in favor of the far better M98 Mauser.

At first, these sporting rifles were generally chambered for the 8mm cartridge originally designed for this action. This round was originally known as the 7.9mm, and later on as the 7.9x57mm or 8x57mm Mauser. Its commercial designation was 8x57J, the "J" meaning Infanterie.* This cartridge was loaded with a bullet of .318" diameter to match the nominal bore (.311") and groove (.320") diameters of the military barrel. Therefore, the correct ammunition to use in the military M88 rifles and carbines is the 8x57J. The sporting rifles were also chambered for the 6.5x57mm, 7x57mm, 8x56mm, 9x57mm and other cartridges, all of them originally factory loaded

to breech pressures of less than 45,000 psi. That was considered maximum safe working pressure for this action.

The clip of the M88 will accept and handle any rimless cartridge having the standard 30-06 head size and those that are no more than about 3.250" long. Cartridges feed in a straight line into the chamber, and even those as short as the 35 Remington will function very nicely. In past years, I have seen several M88 carbines rebarreled to 35 Remington, and their owners liked them very much for hunting deer. I have also seen some rebarreled with an M98 Mauser 8mm barrel so that commercially loaded U.S. 8mm Mauser hunting ammunition could be safely used. U.S.-loaded 8mm Mauser cartridges show a breech pressure of less than 40,000 psi and, therefore, are quite safe for those old actions if the new barrel fitted has a groove diameter matching the

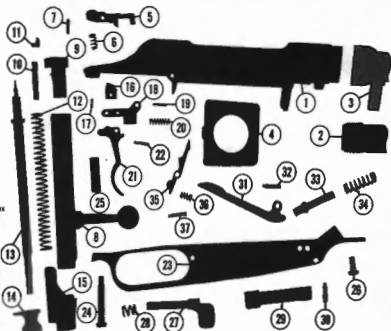
*The literal meaning of this letter "J" in English translation or terminology has been the cause of much confusion. In fact, the "J" in German printing stands for "L," not "or." L.



M88 German Commission action, opened.

Parts Legend

- 1 Receiver (side view)
- 2 Barrel
- 3 Barrel jacket
- 4 Cartridge clip
- 5 Bolt-stop
- 6 Bolt-stop spring
- 7 Bolt-stop pin
- 8 Bolt
- 9 Bolt head
- 10 Extractor
- 11 Ejector
- 12 Mainspring
- 13 Firing pin
- 14 Firing pin nut
- 15 Cooking piece
- 16 Sear
- 17 Sear pin
- 18 Sear lever
- 19 Sear lever pin
- 20 Sear lever spring
- 21 Trigger
- 22 Trigger pin
- 23 Trigger guard/magazine box
- 24 Rear guard screw
- 25 Rear guard screw sleeve (stock bushing)
- 26 Front guard screw
- 27 Safety
- 28 Safety spring
- 29 Magazine box plate
- 30 Magazine box plate screw
- 31 Magazine follower
- 32 Magazine follower screw
- 33 Magazine follower plunger
- 34 Magazine follower plunger spring
- 35 Cartridge clip latch
- 36 Cartridge clip latch spring
- 37 Cartridge clip latch screw



German Model 88 Commission Rifle

Dimensional Action Specifications

Weight	.....3 lbs.
Length	.....3.025"
Receiver ring dia.	.....1.300"
Bolt body dia.	......700"
Bolt travel	.....4.585"
Striker travel	......575"
Guard screw spacing	......9.093"
Magazine well width:	
Front	......480"
Rear	......540"
Length	......3.415"
Bolt face recess:	
Depth	......112"
Dia.	......500"

General Specifications

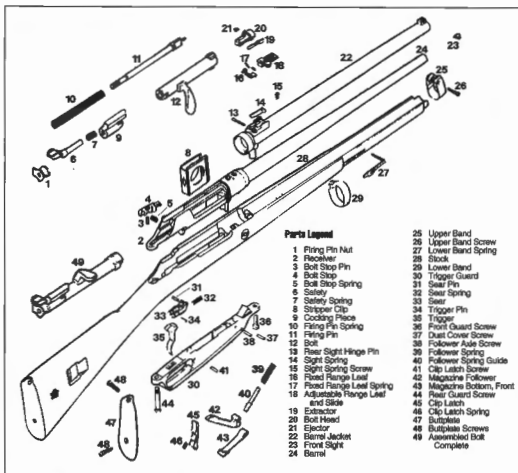
Type	.....Tumbolt repeater.
Receiver	.....One-piece machine steel forging. Slotted bridge.
Bolt	.....Two-piece with dual-opposed locking lugs on forward part of body. Separate, non-rotating bolt head.
Ignition	.....One-piece firing pin, coil mainspring, cooking piece and firing pin nut. Cooks on opening bolt.
Magazine	.....Single column, non-detachable box magazine. Five-shot capacity. Special clip needed.
Trigger	.....Non-adjustable, double-stage military type.
Safety	.....Rotary wing-type safety built into bolt sleeve. 180° swing from left to right, locking striker and bolt when in the "up" or right-side positions.
Extractor	.....Machined, one-piece spring type built into bolt head.
Bolt-stop	.....Separate, hinged to the rear left of receiver. Stops bolt travel by contacting left locking lug.
Ejector	.....Plunger type, built into the bolt head, activated by an integral finger on the bolt stop.

.323" diameter bullet used in these cartridges. In fitting the M98 barrel to this action, it is necessary to turn and thread a new shank.

When the German gunmakers used the M88 action for a sporting rifle, they seldom used the barrel jacket. The front guard screw was threaded into a nut inset into the barrel channel in the forend. When using the military action without the barrel jacket, the collar

on the jacket can be used to cover the threads on the front of the receiver. For looks only, the new barrel should have a shoulder like any sporting rifle barrel, as shown in the drawing of the barrel shank specifications. German gunsmiths installed some double-set trigger mechanisms in these actions, and I see no great problem involved in installing those made for the M98 Mauser in the M88 action.

The German gunmakers also used the basic M88 action, but minus the magazine, for making up many fine, lightweight shot target/hunting rifles. I once owned and used a rifle of this type chambered for the 5.6x52R (22 Savage Hi-Power) cartridge. The receivers of these rifles have a solid bottom, and the action is almost always fitted with a fine double-set trigger. The barrels are usually par-



tially octagonal, fully octagonal or ribbed, and fitted with sporting sights. When the 219 Zipper cartridge was introduced in 1937, I made up a single shot varmint rifle on the military M88 action. I left off all the magazine parts, filled the magazine well opening in the receiver with an aluminum block and used a Krag trigger guard. The bolt face was easily opened to accept the rimmed 219 case. It was one of my first successful varmint rifles, and it dropped many a crow in the Iowa farm country where I lived.

Comments

Thus far I have referred to the action under discussion as the German Model 88 Commission action since it was the first of this type and design to be adopted. Actually, the action

is partly Mannlicher design, partly Paul Mauser's, with some ideas thrown in by the German Testing Commission—whose job it was to find, develop if necessary, and test the new action which was to be adopted. The magazine was entirely the invention of Ferdinand Ritter von Mannlicher, an Austrian arms inventor. It seems likely that Mannlicher may have had a hand in designing the receiver and bolt, although the two-piece design of the bolt, the firing mechanism, safety, trigger and the slotted receiver were all Mauser patents. The forward dual-opposed locking lug system had been used previously on some other rifles, a design feature that is neither Mannlicher nor Mauser. Credit must be given to the testing commission for arranging all of these features in a single action that turned out so

well. Later on, the great Steyr arms factory in Austria, the firm that manufactured most of the many rifles von Mannlicher invented, produced other military and sporting rifles based essentially on the same action. These included the M92 and M93 Romanian rifles in 6.5mm caliber and the M95 Dutch Infantry rifle. Using a rotary spool magazine invented by Otto Schoenauer, one-time head of the Steyr factory, they also manufactured 6.5mm military rifles for Greece.

The bolt and receiver of this rifle, with minor changes and improvements, was essentially the same as the M88 Commission rifle. The M1903 Greek action later became the basis for the world renowned Mannlicher-Schoenauer sporting rifle.

While the M88 Commission action is not



M88 German Commission action.

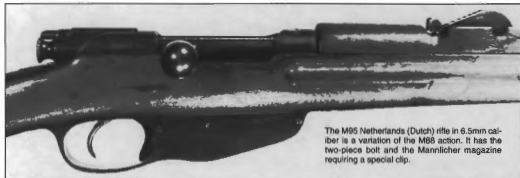
generally referred to as a "Mannlicher" action, other similar actions are, including those with the Schoenauer magazine. Some authorities have flatly stated that the Mannlicher-Schoenauer action has a receiver and bolt invented by von Mannlicher and a magazine invented by Schoenauer—but can the receiver bolt be Mannlicher when the bolt and receiver of its parent action, the M88, was admittedly based largely on Mauser features and those of the Commission? Incidentally, the Hungarian G98/40 (also known as the

Model 98/40 Mauser) has a bolt and receiver based on the same design, but fitted with the Mauser staggered-column box magazine.

M88 rifles and carbines are getting scarcer as each year passes. Beginning military arms collectors will find that obtaining either or both of these arms in original, very good condition is not as easy as it was years ago. Amateur gunsmiths, however, will find it much easier to obtain them, since there are still a lot of them around in a condition suitable for gunsmithing purposes—those in less than

good condition, having been previously reworked or missing some parts. Speaking of parts, parts houses have long been out of bolt heads and extractors for the M88. So, unless you can make these parts, be certain they are not missing from the gun you plan to buy.

In gathering information on the M88, I discovered two unusual items. I found the first one in the 1902 Sears, Roebuck & Co. catalog, which listed and illustrated a sporting version of this rifle at \$24. It was described as a Mannlicher six-shot, high-power sporting rifle in 8mm caliber as made by C.G. Haenel in Suhl, Germany. It had a sporting stock with a pistol grip and short forend, and the 25" barrel appears to be covered by a jacket. In describing the 8mm cartridge, the Sears catalog shows a maximum range of 4500 yards, a killing range of 3000 yards, and a point-blank range of 300 yards! The other item was a Golden State Arms advertisement in a 1958 issue of *American Rifleman* which still listed surplus M88 rifles at \$9.95 each. These two items give us some idea of the time spread that these have been on the American market, indicate that a lot of them must have been made, and that there must still be a lot of them in this country.



The M95 Netherlands (Dutch) rifle in 6.5mm caliber is a variation of the M88 action. It has the two-piece bolt and the Mannlicher magazine requiring a special clip.



Left-side view of the M95 Netherlands (Dutch) rifle. Notice how the stock is made to cover this side of the magazine.



IN THE CHAPTER on the German Model 88 Commission action, I mentioned that the receiver and bolt of the very popular Mannlicher-Schoenauer action evolved from the German Commission-designed Model 88 action, and that several other rifles, including the Model 98/40, have a similar receiver and bolt. In the M88 Commission rifle, we see how the German Testing Commission copied some features from the 71/84 Mauser rifle, used some of their own, and incorporated a Mannlicher-designed single-column magazine to come up with a distinctive and smooth working action. This was followed by the Hungarian Model 1935, also with a Mannlicher single-column magazine. From this rifle, the Hungarian Model 98/40 and the German G 98/40 action evolved—changing the Mannlicher magazine for the Mauser staggered-column flush magazine.

The German 98/40 (the G is usually dropped from the designation), as well as the Hungarian 98/40 (this rifle is more correctly designated as the Hungarian Model 43—“43” because Hungary adopted it in 1943), were created because of Germany’s dire need for military shoulder arms at the beginning of WWII. The Hungarian government arsenal in Budapest was tooled up to make the Mannlicher-magazine Model 1935 rifle, which, except for the magazine drawbacks, was a good rifle. Then by adapting the staggered-column Mauser magazine to it, and chambering it for the 8mm (8x57mm or 7.9x57mm) Mauser cartridge, the 98/40 was born. It is so designated because it has the basic M98 Mauser magazine and was adopted in 1940.

The German Model 98/40 Rifle

The German 98/40 rifle has a 23.6” barrel, is 43.62” overall, and weighs about 8.9

pounds. It has a two-piece stock similar to the British Lee-Enfield rifle, with the forend attached to the barrel by the front guard screw and two barrel bands. The muzzle barrel band contains a bayonet stud so the regular M98 Mauser bayonet can be affixed. Unlike the 98K Mauser barrel, the G 98/40 (G stands for *Gewehr*, German for rifle) barrel has no steps, but has a straight taper from the breech shoulder forward. The magazine holds 5 rounds.

Markings

The model designation of G 98/40 is stamped on the left receiver wall. The date (year) of manufacture, such as 41, which means 1941, is stamped on the top rear of the receiver ring. The factory code letters *JhV* are stamped on the top front of the receiver ring. The letters *JhV* are the code letters for the Metallwaren Waffen u. Maschinenfabrik arsenal in Budapest, Hungary. The caliber (bore diameter), e.g., 7.91, is stamped on the barrel shoulder next to the receiver. The serial number is stamped on the breech end of the barrel, left side of the receiver ring, trigger guard, floorplate, buttstock socket and bolt, and with the last two digits of this number stamped on most of the other major parts.

The 88/40 Action

Although the Model 98/40 action closely follows the design features of the German 88 Commission action and some of the Mannlicher actions mentioned earlier, it has enough individual features to require a separate description. The receiver ring is about 1.735” long. The loading port is about 3.2” long with the higher left receiver wall made with a deep thumb notch like that in the M98 Mauser action. The receiver bridge is very long (about 2.25”) and split; that is,

there is a slot milled through the top to allow passage of the bolt handle and guide rib. The front corners of this slot are grooved to accept the M98 Mauser stripper clips so the magazine can be quickly loaded. The bottom of the receiver is flat. The recoil lug, on the front of this flat, is about 1.60” wide and 2.25” deep. The magazine well is milled out of this flat, leaving an opening 3.30” long and cartridge-guide lips to hold the cartridges in the magazine and to guide them into the chamber.

The magazine box is solidly constructed of sheet metal with reinforced ends, and the bottom of the receiver is milled to hold it securely in place. The rear wall of the magazine box also acts as a recoil lug and makes up for the small area of the main recoil lug on the front of the receiver. Recoil is mainly absorbed by the buttstock against the butt socket, while the rear of the magazine box and the recoil lug prevent the forend from moving forward.

Inside the receiver ring, there are two shoulders which the breech end of the barrel contacts. They are divided by cuts made to allow entrance of the extractor and ejector. The barrel is threaded tightly (right-hand thread) into the receiver with the barrel made with a narrow shoulder to abut against the front of the receiver. A shallow groove cut across the face of the barrel provides room for the extractor and ejector to engage the cartridge rim. This breeching system is the same as used in the Greek Mannlicher-Schoenauer action.

The inside of the receiver is milled out to accept the bolt assembly. Locking lug raceways are milled nearly the length of the action and inside the receiver ring to form

(Pictured above) German Model G98/40 rifle.



Left side of the German Model 98/40 action, opened.

locking shoulders for the two locking lugs on the bolt. Slight inclines on the approaches of these shoulders cam the bolt forward as the bolt handle is lowered.

The bolt is of two-piece design with a separate bolt head which fits into the front of the bolt body. The heavy hook extractor is mortised into the right side of the head, held in place and tensioned by a flat spring mortised in place behind it.

The extractor has a very wide hook and is made so it cannot be pulled out from the front. It has ample movement so the hook can easily slip over the rim of a cartridge placed in the chamber ahead of the bolt. I believe this is even a better extractor than in the commercial Mannlicher-Schoenauer action. The ejector, almost an exact copy of the Mannlicher-Schoenauer ejector, is held in place by a small screw. The bottom corner of the extractor and ejector are rounded off so that, when the bolt pushes a cartridge from the magazine to the chamber, the rim of the cartridge slips under the extractor. This prevents double loading if the bolt is not fully locked before it is drawn back again. This is a good feature. The extractor is also made so that it holds the bolt head in place in the bolt, and on removing the bolt from the rifle, the bolt head cannot accidentally fall out and be lost.

The bolt body has an integral guide rib along most of its length. The bent bolt handle is an integral part of this rib. This rib functions to guide and prevent the bolt from binding as it is operated. It also serves as the safety locking lug since it engages forward of the right receiver bridge wall when the bolt is closed. Its front end moves over an inclined surface on the rear of the receiver

ring and provides the initial extractor camming power when the bolt is opened. The grasping ball on the bolt handle is flattened underneath, and this flat surface is checked.

The bolt body is drilled from the front to accept the coil mainspring and the one-piece firing pin. One side of the rear end of the firing pin is flattened to match a similar hole in the cocking piece through which the rear end of the firing pin extends. This prevents the pin from turning. The firing pin nut threads onto the rear of the firing pin and holds the assembly together. The heavy cocking piece has a heavy rib which moves in a slot in the receiver bridge preventing it from turning when the bolt handle is raised and lowered. There is a small cam on the cocking piece which fits a matching shallow cam and notch in the rear of the bolt body. All this cam and notch do is hold the cocking piece and firing pin back unless the bolt handle is fully down and the action locked, thus preventing accidental firing unless the action is fully locked. When the bolt is open, the cocking cam resting in the shallow notch prevents the cocking piece from turning.

The stem of the wing safety fits in a hole drilled lengthwise in the cocking piece rib. A coil spring over the stem holds the safety back against a notch in the firing pin nut and prevents the nut from turning. When the action is closed and cocked, swinging the safety to the right rotates the flattened end of the safety stem into a notch in the bolt. This locks both the bolt and cocking piece. The safety can also be swung to the right when the cocking piece is forward; this draws the firing pin tip within the face of the bolt and locks it back, as well as locking the bolt.

There is a thumb-piece on the firing pin nut by which the action can be manually cocked with the thumb, or the action can be uncocked (the firing pin lowered) by reversing the procedure. This provides a means to recock the action in case of a misfire. I do not know why the safety was made to lock the cocking piece and bolt when the action is uncocked. This feature is of doubtful value.

The 98/40 bolt-stop is nearly identical to the one on the Greek Mannlicher-Schoenauer action. It is fitted on a stud on the left side of the receiver bridge, and is pivoted on a pin and tensioned by a coil spring. It projects through a hole into the left locking lug raceway and stops the bolt on contacting the ejector, which fits over the locking lug. Like the M-S action, there is a ridge-and-groove arrangement on the bolt-stop and left locking lug, so that unless the ejector and/or bolt head are not assembled on the bolt, the bolt cannot be inserted into the receiver unless the bolt-stop is depressed, but with the bolt head and ejector in place, the bolt can be inserted without depressing the bolt-stop. Since this rifle could actually be fired without the bolt head, which would be very dangerous, the fact that the bolt cannot be inserted into the receiver without first depressing the bolt-stop is a safety feature which reminds the shooter that the bolt is not fully assembled.

The trigger and sear mechanism is similar to that in the M-S rifle. The sear is pivoted on the bottom of the receiver on a pin. The trigger is pivoted on the rear end of the sear on a pin and has two humps which provide the double-stage pull. A projection in the rear of the sear extends through a hole in the

cocking piece raceway in the receiver tang to contact the sear on the cocking piece, and holds it back when the action is closed. This action is cocked on the forward or closing motion of the bolt.

The sear and trigger are tensioned by a coil spring. A head pin inside this spring, with its head resting on the front of the sear, projects into a hole in the receiver. There is a hole drilled into the rear edge of the bolt body, and when the bolt is fully closed and locked, this hole is aligned over the end of the sear safety pin so that, unless the bolt is fully locked, the rifle cannot be fired. This arrangement is similar to that used in the M93 Mauser, Japanese Arisaka and 1917 Enfield. This extra safety device is of no value since the cocking piece will not let the firing pin protrude from the face of the bolt head unless the bolt handle is turned down completely. There is also a narrow groove in the bottom of the bolt which aligns with the sear safety pin when the bolt is forward, but with the bolt handle raised. This allows the trigger to be pulled to release the sear from the cocking piece so that it can follow the bolt forward. However, to lower the bolt handle afterward, the cocking piece has to be pulled back slightly.

Well constructed of sheet metal, the magazine box is held in place under the receiver by the trigger guard plate, with the plate attached to the action by a guard screw through each end and threading into the receiver. A latch in the front of the larger trigger guard bow holds the magazine floorplate in place. Depressing this latch allows

the floorplate to be removed. One end of the W-shaped follower spring is mortised into the floorplate, while its other narrower end fits into the bottom of the milled steel follower. The rear end of the follower is square, and when the magazine is empty, it prevents the bolt from being closed, indicating to the shooter that the magazine is empty. This prevents blind loading. The magazine box, trigger guard plate and latch are not too unlike those of the Japanese 38 Arisaka action.

The method used to stock this rifle is quite different from any other stocking method used on military rifles known to me. It is most like that used on the British Lee-Enfield rifles; that is, with a two-piece stock; a separate buttstock and forend with the buttstock attached to the action by a through bolt. From this point on, however, the Lee-Enfield and the G 98/40 stocking methods differ.

On the Lee-Enfield, the part of the action to which the buttstock is attached is an integral part of the receiver and called the butt socket. On the 98/40 action, the part which I will also call the butt socket is a separate part fitted between the rear end of the trigger guard and the receiver tang. The rear guard screw passes through this part to hold it in place. In addition, the top and bottom of this butt socket are milled out to fit closely over the tang end of the trigger guard to prevent it from pivoting. Hooks at the top and bottom of this part also engage in grooves in the tang and trigger guard, and secure it to the action. In fact, it is so well attached to the action that it is almost an integral part. Two long oblong holes are milled through the inside of the butt socket so that tenons can be made on the forend and buttstock where they fit against it.

A heavy bolt threaded into a tenon on the butt socket is used to fasten the buttstock securely to the action. The forend, with tenons which extend halfway into the butt socket, is also held securely in place on the action by the trigger guard plate, magazine box, recoil lug and the front trigger guard screw. Even without the two barrel bands, the forend is secure.

While the buttstock attachment is no better than on the Lee-Enfield, the forend attachment method on the 98/40 is much superior to that of the Lee-Enfield. As I mentioned in the chapter on the Lee-Enfields, the British had a problem with the forends of their rifles, and I believe a lot of this could have been eliminated and the bedding problems easily corrected had the rear end of the forend been tenoned into the butt socket. The designers of the 1935 Hungarian rifle, from which the 98/40 was developed, probably knew about the forend problems of the Lee-Enfield and designed their forend and the

action so that it would be as secure as if the forend were part of the buttstock. It is believed that the designers went to the two-piece stock design for reasons of economy and to achieve a stronger buttstock. In doing this, they developed perhaps the very best method and arrangement for fitting two-piece stocks.

Comments

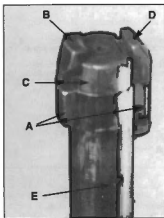
All-in-all, the German Model 98/40 is a good action. It has its share of undesirable features, but it also has some strong points. Manufactured from 1940 to 1945, those made early in this period show much better workmanship and finish than the ones toward the end. In early samples, the bolt moves in the receiver as smoothly as the best Mannlicher-Schoenauer action. Although some experts dislike the separate bolt head feature, I don't think it is that bad. The extractor is probably more rugged than the extractor in the commercial Mannlicher-Schoenauer action. The forward placement of the bolt handle is not liked, but it is necessary in this type of action.

There is no need for the thumb-piece on the firing pin nut. The cock-on-closing feature is not generally liked, and without any extra trouble this action could just as well have been made to cock on the uplift of the bolt handle. The magazine floorplate release latch is neat, and although the floorplate is not hinged to the trigger guard, it is convenient for unloading since it can be quickly removed.

Every part of the 98/40 action is made of steel—there are no stampings or alloy parts. There is little question that the finest steels were used in the manufacture of the major parts of this action, with the receiver and bolt parts properly heat-treated. I believe this action entirely suitable for almost any modern cartridge that is not too long for the magazine box; for if it was safe for the 8mm German military load, it should also be safe for other cartridges developing breech pressures in the 50,000 psi range.

Concluding

The 98/40 rifle and action offer a number of remodeling, sporterizing and rebarreling possibilities. First, the 8mm German cartridge for which this rifle is chambered is entirely satisfactory for big game hunting, and if the rifle you have has an excellent bore, it would be best to leave it in its present caliber. The 98/40 barrel has a very pleasing contour and taper, quite ideal for a sporter. To make a simple sporter, the original military sights can be removed and other sights installed. After removing the military rear sight, the small square step on the barrel can be filed down to smooth out

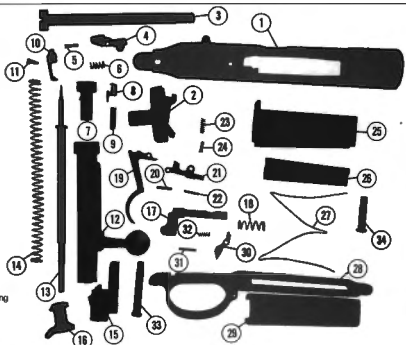


Model 98/40 bolt head showing: (A) dual locking lugs, (B) extractor, (C) bolt head, (D) ejector and (E) gas vent hole in the bolt body.

PART I: Military Rifles & Actions

Parts Legend

- 1 Receiver
- 2 Butt socket
- 3 Stock bolt
- 4 Bolt-stop
- 5 Bolt-stop pin
- 6 Bolt-stop spring
- 7 Bolt hood
- 8 Extractor
- 9 Extractor spring
- 10 Ejector
- 11 Ejector screw
- 12 Bolt
- 13 Firing pin
- 14 Mainspring
- 15 Cocking piece
- 16 Firing pin nut
- 17 Safety
- 18 Safety spring
- 19 Trigger
- 20 Trigger pin
- 21 Seer
- 22 Seer pin
- 23 Seer spring
- 24 Seer safety pin
- 25 Magazine box
- 26 Follower
- 27 Follower spring
- 28 Trigger guard
- 29 Magazine floorplate
- 30 Floorplate catch
- 31 Floorplate catch pin
- 32 Floorplate catch spring
- 33 Rear guard screw
- 34 Front guard screw



German Model 98/40

Dimensional Action Specifications

Weight	.....56 oz.
Receiver length	.....9.312"
Receiver ring dia.	.....1.370"
Bolt dia.	......700"
Striker travel	......815"
Bolt travel	.....4.650"
Magazine length	.....3.300"
Magazine well width:	
Rear	......595"
Front	......525"
Guard screw spacing	.....7.062"

the shoulder contour. Good replacement sights for a hunting rifle made on the 98/40 would be the Williams Guide rear sight mounted on the Williams ramp base. The barrel is not too long, but it can be shortened if desired.

The issue stock and forend can be remodeled if you want to keep expenses to a minimum. The main thing is to shorten the forend. It need not be any longer than about 14 inches.

There are no commercial receiver sights, triggers or safeties available for this rifle,

General Specifications

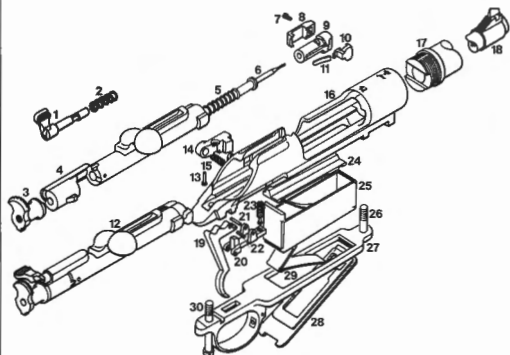
Type	.....Turnbolt repeater.
Receiver	.....One-piece machined steel forging. Slotted bridge with stripper-clip guides.
Bolt	.....Two-piece with separate non-rotating bolt head. Dual opposed locking lugs forward. Bolt guide rib on bolt with its integral bolt handle acts as a safety lug. Flat bolt face.
Ignition	.....One-piece firing pin powered by coil mainspring. Cocks on closing.
Magazine	.....Non-detachable staggered-column box type. Quick-detachable floorplate.
Bolt-stop	.....Mannlicher type positioned on the left side of receiver bridge, stops bolt travel by contacting ejector over the left locking lug.
Trigger	.....Non-adjustable, double-stage military pull.
Safety	.....Wing-type built into the cocking piece, locks striker and bolt when swung to the right.
Extractor	.....Non-rotating, fitted into the bolt head. Uses separate flat spring.
Magazine cutoff	.....None provided.
Ejector	.....Sliding type attached to the left side of bolt head.

although it is possible to install a double-set trigger made for the M98 Mauser action in the 98/40.

There are no rechambering possibilities for this rifle. While no one makes a threaded and chambered barrel available for this rifle, a different caliber barrel can be fitted to

the action. By rebarreling, this action would be suitable for such cartridges as the 257 Roberts, 7mm Mauser, 308 and 358.

I see no practical way to change the action so it cocks on opening, or an easy way to lengthen the magazine to accept longer cartridges.



Parts Legend

- 1 Safety
- 2 Safety Spring
- 3 Firing Pin Nut
- 4 Cocking Piece
- 5 Firing Pin Spring
- 6 Firing Pin
- 7 Ejector
- 8 Ejector Screw
- 9 Bolt Head

- 10 Extractor
- 11 Extractor Spring
- 12 Bolt Assembly
- 13 Bolt-stop Pin
- 14 Bolt-stop
- 15 Bolt-stop Spring
- 16 Receiver
- 17 Barrel
- 18 Front Sight
- 19 Trigger
- 20 Sear

- 21 Sear Pivot Pin
- 22 Trigger Pin
- 23 Sear Spring and Safety Pin
- 24 Magazine Follower
- 25 Magazine Box
- 26 Front Guard Screw
- 27 Trigger Guard
- 28 Floorplate
- 29 Magazine Spring
- 30 Rear Guard Screw

Takedown and Assembly

Make sure the rifle is unloaded. To remove the bolt, raise the bolt handle and pull the bolt back while depressing the bolt-stop. Disassemble the bolt by first removing the bolt head. This is done by turning the bolt head so the ejector is in line with the bolt rib. Using a cartridge, place its rim under the extractor hook, lift or tip the hook outward, and pull the bolt head from the bolt. Turn out the ejector screw to remove the ejector. Remove the extractor by pushing down on the extractor spring with a tool so the extractor can be moved back and lifted out. Lift out the extractor spring. In reassembling the extractor, first insert the extractor

spring in its slot with its round end to the rear, then push the extractor down until it slips in place.

Remove the firing mechanism by depressing the safety forward and unscrewing the firing pin nut from the firing pin, after which all the parts can be removed. Reassemble in reverse order, turning the firing pin nut on as far as it will go and then backing it off until the safety engages in its notch in the nut.

Remove the buttstock by first removing the buttplate; then using a long screwdriver, turn out the stock bolt. Depress the floorplate latch and remove the floorplate, follower and spring. The follower and floorplate can then be slipped off of the spring. Remove barrel

bands and trigger guard screws. Next, remove the trigger guard from the forend and the forend from the barrel. The buttstock socket and the magazine box are also released at this time. Drive out the floorplate latch pin to remove the latch and spring. Drive out the sear pin to remove the sear and trigger mechanism.

Push the bolt-stop pin out toward the bottom and remove the bolt-stop and spring. Reassemble in reverse order. The narrow end of the follower spring fits into the follower.

The barrel is threaded very tightly into the receiver and cannot be easily removed, nor should it be removed unless necessary, and then only if the proper tools are available.



Greek Model 1903 Mannlicher-Schoenauer

TO MOST RIFLEMEN, the name Mannlicher-Schoenauer brings to mind a sleek little sporting rifle having a slim forend that extends to the muzzle of its short barrel. It is in the "elite" class of bolt-action sporting rifles, and it's gained worldwide recognition and fame. Its popularity does not seem to decrease despite the great many other bolt-action rifles it has had to compete against since it was first introduced many years ago. It all started with the Greek Model 1903 M-S military rifle, for the M-S sporting rifle is basically a sporterized version of the military rifle.

The M-S action was developed in the Austrian Arms Factory at Steyr in 1900, the name deriving from those of Ferdinand Ritter von Mannlicher and Otto Schoenauer. Mannlicher, born in Mainz, Germany, in 1848, became one of the world's leading military arms designers. He died in Austria in 1904. He is most noted for his development of the clip-loading magazine system, "straight-pull" rifle actions, and automatic rifles and pistols, for which he obtained many U.S. and foreign patents. Most military arms produced by the great Austrian Arms Factory, often called the Great Steyr Works, from the mid-1880s on, were of Mannlicher design. Otto Schoenauer, a native Austrian, was the director of the Austrian Arms Factory for a number of years. His main claim to fame is the rotary-type magazine used in the M-S rifle.

Although he was not the first inventor of the rotary-spool magazine system, Otto Schoenauer began working with that idea before 1885; it was first combined with a turnbolt 43-caliber rifle of Mannlicher design in 1887. A year later it was adapted to a Mannlicher straight-pull rifle. In the United States, Arthur Savage was working on his lever-action rifle fitted with a rotary-spool magazine, which he perfected by 1893 and on which he obtained patents. He became famous for his efforts which resulted in the Model 99 Savage rifle, which was made for many years.

The Schoenauer spool magazine, however, was not fully perfected until about 1900, when it was first successfully combined with a small-caliber turnbolt rifle. It is believed that

Portugal obtained a few of the Model 1900 M-S military rifles. This rifle, with minor modifications, was adopted by Greece in 1903, and designated the Greek Model 1903 Mannlicher-Schoenauer rifle. It was produced in large numbers by the factory of which Schoenauer was the director. Mannlicher supplied most of the action designs.

At this point, I must backtrack a bit. In an earlier chapter I described the German Model 88 Commission action, designed by a group of men who borrowed some features from an earlier Mauser action and used the Mannlicher patented clip-loading single-column magazine system. Adopted by Germany in 1888, the only thing about this action which was "Mannlicher" was the magazine.

The Austrian Arms Factory in Steyr was one of the firms which contracted to make the M88 rifles for Germany. Because of the magazine, and because Mannlicher was also associated with the firm, and perhaps because they made some sporting rifles based on this action, the 88 rifles were often referred to as "Mannlicher" rifles.

When the Steyr factory developed the M-S rifle in 1900, they freely borrowed and copied the basic receiver and bolt features of the 88 action, fitting it with the Schoenauer rotary-spool magazine. This was an expedient thing to do, since it was a smooth and very reliable turnbolt system and they were already making the 88 rifle. No doubt Mannlicher had a hand in modifying and adapting the 88 receiver for the Schoenauer magazine, but designing it so it could be readily detached from the rifle for cleaning. He was also responsible for the several changes and improvements on the bolt. The basic action, nonetheless, was not his creation.

Regardless of the minor role that Mannlicher had in the development of the Model 1903 Greek rifle, that rifle, as well as all future rifles based on this action, were and are still known as "Mannlicher-Schoenauer" actions.

Greece adopted the M-S rifle in 1903, and it was to remain their principle military shoulder arm until after WWII. Compared to many other military bolt-action rifles, the M1903 and the later 1903/14 Greek rifles did not gain any

spectacular recognition as military arms outside of Greece. The M-S action, however, gained worldwide acclaim and popularity when used in the Steyr-built sporting rifles. First made and introduced to European hunters in 1903 or 1904, its most distinctive feature was a very short barrel and a very slim forend that extended to the muzzle. It is this feature more than anything else that the name "Mannlicher" has been associated with, and to such an extent that even today any rifle similarly stocked is called a Mannlicher-stocked rifle.

There were two model designations and a carbine and rifle version of each designation of the Greek M-S military arm. The 1903 Greek rifle (marked STEYR 1903 on the receiver) is 43.3" overall, has a 28.5" barrel and weighs about 8.3 pounds. The 1903 Greek carbine is 39.4" overall, has a 19.7" barrel and weighs about 7.3 pounds. Both have a wooden handguard which extends from the receiver to the middle barrel band. The Model 1903/14 Greek rifle and carbine (marked STEYR 1903/14 on the receiver) adopted in 1914 are almost the same as the 1903s except that the handguard extended from the receiver to the upper barrel band. All are chambered for the 6.5 M-S cartridge and made so a bayonet can be attached to the muzzle.

The 1903 and 1903/14 Greek military rifles were rather late-comers on the U.S. surplus arms market, not generally offered for sale until about 1961. Carbiners were first priced about \$35 each, the rifles at about \$30; M98 military Mausers were then selling for about the same prices. I thought the Greek M-S rifles a good value when compared with any other military surplus bolt-action rifle then being offered, except that their bores were neglected and usually dark. However, they apparently sold well, for after a year or so they were no longer advertised. Evidently, however, many of them must have had bores and/or stocks in such poor shape that, shortly after the rifles were first offered, separate actions were also

(Pictured above) Greek Model 1903/14 Mannlicher-Schoenauer military rifle.

made available. Moderately priced (\$10 to \$15) the actions also apparently sold well, for they too were soon off the market. At any rate, for a short time the amateur gunsmith had the opportunity to purchase a genuine Mannlicher-Schoenauer rifle or action, an opportunity which may never again be presented.

The Greek Mannlicher-Schoenauer Action

The receiver is a heavy one-piece steel forging machined to accept the barrel, bolt, magazine and other parts. The front end of the receiver is bored and threaded to accept the barrel shank. Inside the receiver ring, there is a collar against which the barrel abuts. This collar surrounds the bolt head except for a slot on the left side for the ejector. Underneath the round receiver ring is a small stud projection, which is tapped for the front receiver screw. It is not large enough to transfer adequately the recoil to the stock, but on military rifles, a separate recoil plate is inletted into the stock, just to the rear of the stud.

The top and right center of the receiver are cut out to gain access to the magazine opening. Much metal is left under the center of the receiver, enough metal for front and rear walls, and this is milled to accept the various magazine parts. The magazine well opening in the receiver is milled out on the left side of the receiver bottom to allow passage of the cartridges from the magazine into the chamber.

The inside of the receiver proper is precisely bored and milled out for the bolt and its locking lugs. Recesses with angled approaches, cut into the rear of the receiver ring, leave locking shoulders to engage locking lugs. The angled slope on the forward corner of each shoulder draws the bolt forward as the bolt is rotated closed. The receiver bridge is slotted to allow passage of the bolt handle, and the front of this slot is grooved to accept a magazine-charger



Greek Model 1903 military Mannlicher-Schoenauer action.

clip. The rear of the receiver ends in a tang into which the rear receiver screw threads.

The small one-piece bolt-stop is attached to the left side of the receiver bridge and pivots on a stud made integral with the receiver. A pin holds the bolt-stop on the stud, and a coil spring in the rear of the bolt-stop provides the tension. An extension on the front of the bolt-stop, projecting through a hole in the receiver wall into the locking lug raceway, halts the bolt in its rearward motion as it contacts the ejector and bolt locking lug.

The bolt has a separate non-rotating bolt head. Mortised into the right side of the bolt head and its stem is a one-piece spring extractor—no stronger or weaker than that of the 88 Commission action. Loosely mortised into the left side of the bolt head, so that it has some longitudinal movement, is the ejector. It is held in place by a small screw. The ejector extends back and overlaps the locking lug when the bolt handle is raised so that, on pulling the bolt back, the bolt-stop pushes the ejector forward to eject the cartridge or fired case before the bolt is halted, when the ejector contacts the locking lug. This arrangement, and the ejector itself, is much better than the

ejector system in the 88 action. The outside front edge of the ejector is beveled to move the bolt-stop out of the way when the assembled bolt is inserted into the receiver.

The bolt-head face is not recessed for the cartridge head. Instead, the breeching system is so made that, when the bolt is locked closed, the flat face of the bolt head contacts the breech end of the barrel. The chamber is deep enough to let the cartridge head lie flush with the end of the barrel. Shallow grooves cut across the face of the barrel allow room for the ejector and extractor. A good arrangement, but it makes barrel fitting a bit more difficult than it is with the 88 action, which has a recessed bolt head.

The bolt body is drilled from the front to accept the firing pin, mainspring and bolt head. A small lug on the stem of the bolt head, and a matching longitudinal and circular groove inside the front of the bolt, hold these two parts together, allowing the bolt head to be removed and replaced when it is turned to a certain position. The dual-opposed locking lugs are on the extreme front end of the bolt body, both solid and quite large. The top front corner of the right (or bottom) locking lug is beveled to match a similar beveled surface left

Left-side view of the opened military Mannlicher-Schoenauer action.



PART I: Military Rifles & Actions

inside the locking-lug recess in the receiver ring. This provides the initial extraction camming power when the bolt handle is raised.

The front of the left locking lug has a circular groove cut across its face. The rear of the projection on the bolt-stop, which projects into the locking lug raceway, has a ridge to match the groove in the left locking lug. Unless the ejector is in place, or the bolt head and ejector are not assembled on the bolt, the bolt cannot be inserted into the receiver unless the bolt-stop is purposely depressed in doing so. Thus, the groove and hook arrangement on the locking lug and bolt-stop serves as a warning that, unless the bolt can be inserted into the receiver *without* manually depressing the bolt-stop, something is amiss. This could prevent an extremely dangerous situation from arising, since it is possible to fire the rifle with the bolt head missing.

The straight bolt handle, with its large hollow grasping ball, is an integral part of the bolt body. Also made integral with the bolt is the guide rib, which extends forward of, and becomes part of, the base or root of the bolt handle. This rib affords additional anchorage for the bolt handle, but also guides the bolt and prevents its binding. The rear of the rib, or the base of the bolt handle, is not high enough to contact the front of the receiver bridge, so apparently no effort was made to provide a positive safety lug arrangement. In the event the front locking lugs or receiver ring should fail, however, the bolt handle itself would prevent the bolt from being driven out of the receiver. The center of the guide rib is milled out to keep weight to a minimum.

The firing pin and mainspring are inserted through the front of the bolt, the mainspring being compressed over the firing pin stem between a shoulder on the front of the firing pin and a shoulder in the rear of the bolt body. The heavy cocking piece fits over the rear end of the firing pin, held there by the firing pin nut, which is secured to the firing pin with an interrupted lug arrangement. Flat surfaces on the rear of the firing pin, engaging a matching



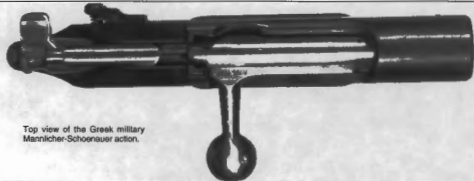
Main parts of the military M-S action, showing complete bolt assembly at top, receiver in the center, and detachable rotary magazine assembly at bottom.

hole in the cocking piece, and the flattened front end of the firing pin, engaging a matched slot in the bolt head, prevent these parts from turning on the firing pin.

A cam projection on the cocking piece, matching a notch in the rear of the bolt body, cocks the firing mechanism when the bolt handle is lifted. This cocking action is easy because of the smoothness of the contacting metal surfaces. Since the firing pin nut, cocking piece, safety and safety spring are part of the firing mechanism, and are attached to the firing pin, lock time is a bit sluggish, but ignition is positive because of the weight of these parts.

The wing safety is positioned in a hole in

the upper part of the cocking piece and into an extension of the cocking piece which extends forward into the slot in the receiver bridge. It is tensioned by a short coil spring which fits over the stem of the safety. This keeps it pushed back against the firing pin nut, which holds the safety in place, and which in turn prevents the firing pin nut from being turned unless the safety is pushed forward. When the action is cocked, swinging the safety up and to the right locks both bolt and cocking piece. This is accomplished by the end of the safety stem engaging in a notch in the end of the bolt. With the action uncocked (striker forward), the safety can be depressed and swung over to the



Top view of the Greek military Mannlicher-Schoenauer action.



Issue military M-S trigger (right) can be modified and improved, as shown at left, by installing an adjustment screw on its upper end, plus bending and straightening the lower end.

right to lock the bolt, but this is to allow the bolt to be disassembled easily, rather than to lock the bolt in the action.

One very small gas escape hole in the bolt is the only outlet should gas enter the firing pin hole. This hole, just forward of the main-spring shoulder on the firing pin, is exposed in the front of the receiver opening when the bolt is closed and locked.

The trigger assembly consists of trigger, trigger pin, sear, sear pin, sear lever, sear lever pin and sear lever spring, mounted under the receiver on the sear lever pin. The trigger has the usual two humps that provide the standard double-stage military pull.

The trigger guard bow, large and heavy, is held in place in the stock, along with the rear part of the receiver, by a tongue-and-groove arrangement with the receiver at the front, and by the rear receiver screw, which passes through the rear of the guard and stock, and threads into the receiver tang. The front of the receiver is held in the stock by a screw that runs through an escutcheon in the bottom of the stock.

The Schoenauer Magazine System

The most interesting feature of the Mannlicher-Schoenauer action is the box magazine, whose spring-tensioned rotary spool feeds cartridges into the path of the bolt.

The heart of the magazine is the spool, held in upright standards over a box-like trough,

much like an old-fashioned chicken feeder. The spool has 5 shallow grooves that conform to the diameter and shape of the 6.5 M-S cartridges. The cartridges are not separated except for the first and last, which are divided by a wing that is actually the follower. A coil spring inside the spool provides the rotary power to feed the cartridges into the action. Bearings at the spring ends provide the means to anchor the spool to the standards and to keep the spool wound.

The floorplate is attached to the bottom of the box via a stud and spring clip, allowing the plate to rotate. The fore and aft magazine projecting walls under the receiver are milled out to accept the magazine box. Their inner ends are grooved for the ends of the floorplate so the magazine is locked in place when the floorplate is lengthwise with the action. A spring clip in the bottom of the magazine box, engaging a recess in the floorplate, locks the floorplate in its lengthwise position and, when depressed, allows it to be rotated.

The magazine well opening, in the left side of the receiver, slants slightly in that direction so that as the cartridges are fed into and out of the magazine, they are guided around the spool and magazine box. Circular cartridge guide-ways about $1/4$ " wide, built into the front and rear of the magazine opening in the receiver, and in the magazine box, hold the cartridges in a circle against the spool, allowing the cartridges to move around without much friction.

To allow insertion of cartridges into the magazine and to prevent them from coming out again, a cartridge-stop was fitted into a milled cut in the underside of the right receiver wall. It is held in place, and pivots on, a screw through the front of the receiver wall. It is tensioned by a small coil spring. The rear part of the cartridge-stop projects through a hole near the rear of the right side of the magazine well opening, and a checkered projection protrudes through another opening in the top of the wall.

On loading a cartridge into the magazine and pressing it down with the thumb, the cartridge-stop is depressed as the cartridge moves over it; when thumb pressure is removed, the cartridge, forced up by the tension of the magazine spool, is halted by the bolt-stop so that only part of the cartridge projects in the path of the bolt. The magazine can be fully loaded by inserting one cartridge at a time, or loaded by stripping cartridges from a charger clip. The loaded magazine can be quickly emptied by merely pressing down on the checkered projection on the bolt-stop.

The Schoenauer magazine system is reliable in every way. It holds five cartridges in a space only slightly larger than needed for a staggered-column magazine. Feeding is positive and smooth, and there is only one path for the cartridges to take as they are fed into the chamber. The spool prevents cartridges from moving forward as the rifle recoils. This prevents bullet point mutilation. Finally, the magazine box and spool can be easily removed for cleaning.

The Schoenauer magazine has disadvantages. It is much more costly to make than a staggered-column type because every part of the system has to be made for the specific cartridge for which the rifle is chambered. Once so made, it is not readily adaptable to cartridges with different dimensions.

Takedown and Assembly

Make sure chamber and magazine are empty. To remove the bolt, raise the bolt handle and pull it back and out while depressing the bolt-stop. To disassemble the bolt, grasp the bolt body in one hand and, with the other, rotate the cocking piece $1/4$ -turn counterclockwise so it is against the bolt; depress the safety and swing it to the right. Turn the firing pin nut $1/4$ -turn counterclockwise and pull it free; swing the safety to the left, remove it from the cocking piece off the firing pin; now grasp bolt head firmly (remember it is under tension of the mainspring), turn it counterclockwise until the ejector is in line with the guide rib and ease it forward. This will release the firing pin and mainspring so they can be pulled forward out of the bolt. Remove the ejector by turning out its screw and sliding it forward. Remove the extractor by lifting its front end up with a

Mannlicher-Schoenauer Triggers

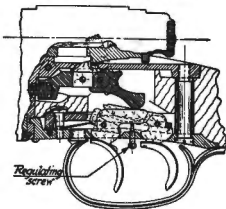
Single and Double-Set for Rifles and Carbines

Adjustable Single or Double-Set Triggers

All models, both rifle and carbine, come with choice of regular single trigger or double-set triggers. The single trigger is of the clean crisp shotgun type, that is, it is completely without creep, the pull being about 4½ lbs., and is the type most shooters are accustomed to. Below, it will be seen that the single trigger is provided with a regulating screw, permitting adjustment of pull.

The double-set trigger represents a novelty to most American shooters, but once understood, has numerous advantages, particularly when used with a scope. In this type, the front trigger alone always fires the gun, the rear trigger never does, its sole function being to "set" the front trigger thus making a "half" trigger of it. If the rear trigger is ignored, the gun is fired by using the front trigger, though the pull is somewhat heavier and less sharp than on the regular single trigger model. The reason for this will be clear from a study of the two illustrations, whereby it will be seen that the leverage exerted in the single trigger is several times as great as in the double-set. To make a "half" trigger of the front trigger, the rear is pulled back until it clicks, and the front trigger is then "set" and a pressure of a few ounces fires it. This is perfect for long-distance scope shots as the gun may be fired the instant the bead is on the target. If the trigger is "set", it can be used without firing the gun or opening the bolt. To accomplish this, the rear trigger is pulled first, and while pressure is on the rear trigger, the front trigger is pulled very lightly, and the gun is back to normal pull. This last "trick" should be practiced on an empty chamber until it is thoroughly understood. A small regulating screw is located between the triggers, permitting adjustment of from nothing to about three ounces.

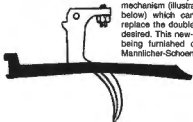
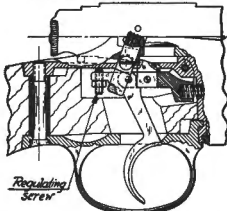
DOUBLE TRIGGER MECHANISM



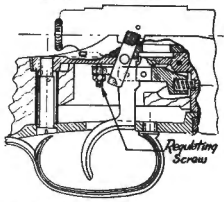
This illustration shows double-set trigger unit complete with trigger lever. This entire unit can be replaced or used interchangeably with the single trigger mechanism shown at right.



OLD SINGLE TRIGGER MECHANISM



NEW SINGLE TRIGGER MECHANISM



This is the new style single trigger mechanism (illustrated more fully below) which can be used to replace the double trigger unit if desired. This new-style trigger is being furnished on all current Mannlicher-Schoenauers.

A page from the 1939 Stoeger's catalog showing the different trigger mechanisms for the commercial M-S sporter at that time. (Courtesy Stoeger Industries)



Regular sporter-type rifle built around the Greek military M-S action. The action was fitted with a new barrel, a flat bolt handle and a 1903 Springfield trigger guard bow, and to this the Fajen stock was fitted. The Weaver K-6 scope is mounted in Weaver top-detachable rings on a Weaver 60 base attached to the receiver ring with two 8x40 screws.

screwdriver, then pull it forward. To avoid any chance of breaking the extractor, it should not be removed unless necessary. Reassemble in reverse order.

Using a bullet point or some other pointed tool, depress the floorplate latch spring through the front hole in the floorplate. Turn it about $1/4$ -turn and pull out the magazine. Remove the magazine spool by depressing the rear spool bearing and lifting up the rear of the spool. Remove the bearings and magazine spring from the spool by rotating the front bearing counter-clockwise about $1/4$ -turn until it pops out and unwinds; the bearings and spring assembly can now be pulled out. It is best not to remove the spring bearings, although this can be done by lifting the hooked ends of the spring from each bearing. The spool spring, with bearings attached, is reassembled by inserting it into the spool and rotating it until the small bearing projects through the spool; now depress the large bearing and turn it about one full turn counter-clockwise until it falls into place and is locked into the spool. The assembled spool is fitted in place by inserting the large bearing into its slot in the magazine box and then depressing the rear bearing until it slips into place.

The floorplate can be removed by driving the spring clip off of the floorplate stud, which will release the floorplate and the spring catch. Reassemble in reverse order. The assembled magazine can then be inserted into the action and locked in place by turning the floorplate lengthwise with the action.

To remove the barrel and action from the stock, remove the magazine and barrel bands; turn out the rear receiver screw, lift the rear of the trigger guard out of the stock, slide it back and remove it; turn out the front receiver screw and the barreled action can be lifted out of the stock. Drive out (downward) the bolt-stop pin to remove the bolt-stop and spring. Turn out the cartridge-stop screw from the right side of the receiver and work out the cartridge-stop and spring. Drive out the sear lever pin to remove the trigger assembly. Drive out the sear and trigger pins to remove the sear and trigger. Reassemble in reverse order. The barrel is screwed tightly into the receiver (right-hand threads), and it should not be removed unless the action is to be rebarreled, and then only if the proper tools are available.

Re chambering and Rebarreling

I've already pointed out some limitations of the M-S action and magazine, but there are more. There is just no way in which this action, made for the 6.5 M-S cartridge, can be altered to handle a cartridge whose overall length is more than about 3.10", nor any practicable or easy way it can be made to handle any cartridge much shorter than about 2.875". The new cartridge, which must also be a rimless type, practically eliminates all modern cartridges except the 257 Roberts, 244 (or 6mm Remington) and the 7mm Mauser. While these three fall within the noted length limitations,

they still pose an insurmountable problem in the altering of the magazine to handle them because the bodies if these cartridges are of larger diameter than the 6.5 M-S cartridge. I feel that the only practicable rebarreling of the Greek M-S would be to its original caliber.

Good and Poor Features

To begin with, all of the Greek M-S military actions I've seen and handled, whether Steyr- or Beretta-made, were very well made in every detail. Undoubtedly the very best steels were used to make the various parts, and these parts properly hardened and tempered (or heat-treated) according to the task they had to perform. All parts are well fitted, finished and smooth. Some parts are polished very smooth, including the exterior of the bolt, magazine spool and the contracting surfaces of the various moving parts. All of this makes for a tight fitting yet smooth working action. Its smoothness of operation rivals that of our Krag. In fact, most of these military actions I've handled operated as easily and as smoothly as the action of any commercial M-S sporting rifle made. It is this smoothness, plus the looks and feel of the sporting carbine, that most impresses the sportsman who handles this rifle for the first time.

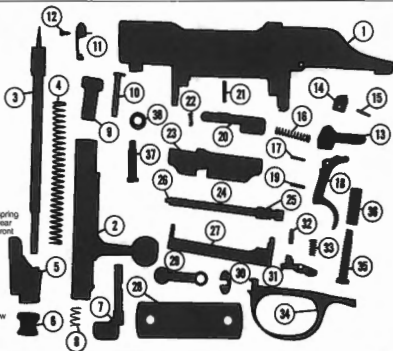
I like the breeching system of this action, which is not too unlike the M98 Mauser breeching, and the bolt-stop and ejector system, plus the fact that both locking lugs are solid. I also like the cartridge-stop arrange-



Close-up of the above sporting rifle showing the altered safety wing, flat bolt handle, 1903 Springfield trigger and guard bow, and Weaver scope mount.

Parts Legend

- 1 Receiver (side view)
- 2 Bolt body
- 3 Firing pin
- 4 Mainspring
- 5 Cocking piece
- 6 Firing pin nut
- 7 Safety
- 8 Safety spring
- 9 Bolt head
- 10 Extractor
- 11 Ejector
- 12 Ejector screw
- 13 Sear lever
- 14 Sear
- 15 Sear pin
- 16 Sear lever spring
- 17 Sear lever pin
- 18 Trigger
- 19 Trigger pin
- 20 Cartridge-stop
- 21 Cartridge-stop screw
- 22 Cartridge-stop spring
- 23 Magazine spool
- 24 Magazine spool wind-up spring
- 25 Magazine spool bearing, rear
- 26 Magazine spool bearing, front
- 27 Magazine spool box
- 28 Magazine floorplate
- 29 Floorplate latch
- 30 Floorplate retainer clip
- 31 Bolt-stop
- 32 Bolt-stop pin
- 33 Bolt-stop spring
- 34 Trigger guard bow
- 35 Trigger guard screw
- 36 Trigger guard (stock) screw bushing
- 37 Receiver screw
- 38 Receiver screw stock escutcheon



Greek 1903 Mannlicher-Schoenauer

(Uses 6.5 M-S cartridge)

Dimensional Action Specifications

Weight	.....48 oz.
Overall	.....8.750"
Receiver ring dia.	.....1.290"
Bolt body dia.	......705"
Bolt travel	.....4.565"
Striker travel	......605"
Magazine opening (length)	.....3.075"
Bolt face	.....Flat, no recess.

ment, which allows easy and convenient removal of cartridges from the magazine.

There are many things I don't like about the M-S action, some of which I consider poorly designed. I don't like the slotted bridge or the forward placement of the bolt handle, nor do I like the firing mechanism, with the heavy cocking piece and safety hung on the firing pin.

After almost 70 years of nearly continuous manufacture, the modern M-S action had almost the same firing mechanism, and I should think that it could have been improved.

I do not particularly dislike the separate bolt head, but the extractor is far from being the best. Of all its action parts, the bolt head and extractor are most often lost, and the

General Specifications

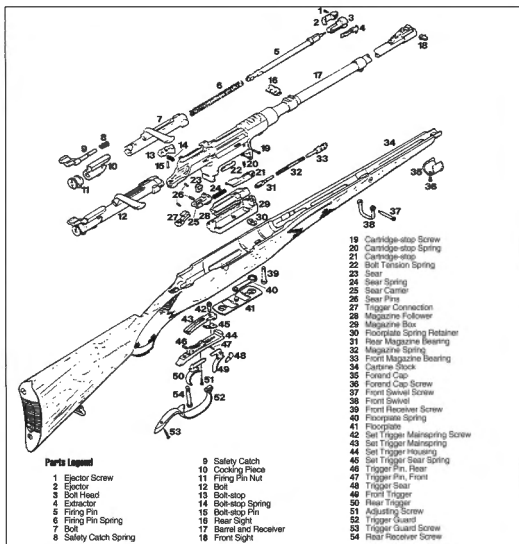
Type	.....Tumbolt repeater.
Receiver	.....One-piece machined steel forging with slotted bridge. Stripper-clip charger guide milled in the bridge.
Bolt	.....Two-piece, with separate non-rotating bolt head. Dual-opposed locking lugs on front of bolt body. Bolt handle acts as a safety lug.
Ignition	.....One-piece firing pin, coil spring powered. Cocks on opening bolt.
Magazine	.....Rotary spool, five-shot capacity, detachable box-type.
Trigger	.....Non-adjustable, double-stage military pull.
Safety	.....Rotary wing-type built into cocking piece, 180° swing from left to right, locks striker and bolt when swung up or right.
Extractor	.....One-piece non-rotating spring extractor mortised in bolt head.
Magazine cutoff	.....None.
Bolt-stop	.....Photing type, located at left rear of receiver.
Ejector	.....Sliding type fitted on bolt head, activated by bolt stop.

extractor the part most often broken. Because of the separate bolt head design, the receiver ring and bolt travel are proportionally longer. Because of the long cocking piece, the receiver bridge is also quite long. The rotary spool magazine system requires longer space than would a staggered-column box magazine holding a cartridge of the same length. Considering, however, the size and length of the 6.5 M-S cartridge, the M-S action seems unduly long and heavy.

Despite these criticisms, I still like this action very much. Just as many shooters complained when the Model 70 Winchester action was changed in 1964, I imagine that a similar reaction occurred when the Mannlicher-Schoenauer action was changed.

Gunsmithing

When surplus Greek M-S rifles and actions were available in the early 1960s, amateur gunsmiths all over the U.S. and Canada



expressed a great deal of interest in them. I know that many were rather disappointed in this action because of its limitations, while others bought a rifle or an action or two or more to lay away for the day they could build that "Mannlicher" rifle—that sleek little sporter they have seen in the Stoeger's catalog for many years but could never afford.

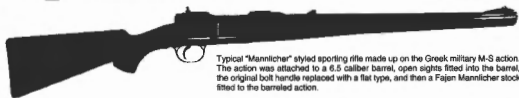
When the Greek M-S military rifles and actions were first available as surplus arms, I obtained several of the actions. I did considerable experimental work with them, since little has been written about them in gunsmithing

books. What I learned should interest those wanting to know the practical use of this rifle or action when remodeling or building a rifle on it.

If you have a complete and original Greek M-S rifle or carbine in excellent condition inside and out, you might consider the fact that they have some value as a collector's item because they're not very common.

The M-S rifle or carbine can be readily remodeled into a very fine sporter, for it has one of the best shaped and designed stocks of any military rifle. If you have the rifle, a stan-

dard-type sporter can be made from it by discarding the handguard, removing the rear sight, cutting off the forend just to the rear of the middle barrel band, and shortening the barrel to 24" or 22". Or, if you want to make a typical Mannlicher carbine from either the rifle or carbine, shorten the barrel to 18", fit a steel Mannlicher-type forend cap on the end of the forend and then trim the entire forend down. Install an open rear sight and a front sight of your choice on the barrel. Lastly, cut off the bolt handle and weld on a flat Mannlicher-type handle. I have made flat



Typical "Mannlicher" styled sporting rifle made up on the Greek military M-S action. The action was attached to a 6.5 caliber barrel, open sights fitted into the barrel, the original bolt handle replaced with a flat type, and then a Fajen Mannlicher stock fitted to the barreled action.

handles from the shank of a small open-end wrench or a flat spoke from an old farm implement wheel.

If your rifle or carbine has a ruined bore and you want to use it, my suggestion would be to have a new barrel fitted in its original caliber. It can then be remodeled as outlined above.

There is no receiver sight made for this rifle, and it is most difficult to adapt any other receiver sight to fit it. I've successfully mounted a scope on this action using the one-piece Weaver 60 base, attaching it to the receiver ring with two 8x40 screws. This also required the installation of a new bolt handle to clear the scope.

In attaching a new bolt handle to achieve a very low profile, and so it will clear the eyepiece of a low-mounted scope, it may be necessary to weld it directly to the bolt guide rib. This will then require notching the side of the stock and cutting down the right side of the receiver bridge. In any case, the clip-charger humps should be filed down.

To my knowledge, there is no commercial safety or trigger made for this action. I solved the safety problem when a scope is mounted low by cutting off most of the wing from the original safety and silver soldering on an L-shaped piece of flat steel, as shown in the illustration. The original trigger can be improved by fitting it with an adjustment screw, as shown. I have also replaced the original trigger with a 1903 Springfield trigger, modifying it as required. The original M-S trigger guard bow is unusually large and heavy, and on one rifle, I replaced it with a 1903 Springfield guard. This not only improves the looks, but in combination with the Springfield trigger, the trigger and bow are placed farther to the rear and closer to the grip, making for better handling and feel.

A double-set trigger mechanism made for the M98 Mauser can be installed in the Greek M-S action. On one rifle I remodeled, I saved

off the bow, or loop part, from the guard, installed the trigger mechanism in the plate that was left, and then fitted a double-barrel shotgun guard to the plate and grip, nearly duplicating the original double trigger set-up of the commercial M-S rifle.

Additional Comments

I don't know how many Greek M-S military rifles and carbines were made, but the figure must surely be in the scores or hundreds of thousands. Of all the military and commercial centerfire turnbolt actions discussed in this book, I believe more separate manufacturing operations are required to make the Mannlicher-Schoenauer action than any of the others.

The 1903 and the 1903/14 Greek M-S rifles are serial numbered. The complete serial number is usually stamped on the receiver ring, on the bolt guide rib and on the breech end of the barrel, and with two or more digits of this number stamped on such other parts as the bolt head, cocking piece, firing pin, firing pin nut and safety. If all the numbers match, this indicates all of the numbered parts are original. The place and date (year) of manufacture are usually stamped on the left receiver wall, as for example: STEYR 1914 or BERETTA and date. The model designation of the rifle is usually stamped on the receiver ring, as for example: Y:1903/14. A crown over a cross within a shield is also usually found stamped on the receiver ring.

The 6.5 M-S Cartridge

The 6.5 M-S cartridge was developed and introduced with the M-S military rifle in 1900, and adopted by Greece in 1903. It is a rimless, bottlenecked cartridge, loaded with a long round-nosed bullet. The 6.5 M-S case is slightly smaller at the head (.453") than the 30-06 case (.473" head dia.). As a military cartridge, it was certainly as good as the 6.5mm Japanese and 6.5mm Italian-Carcano

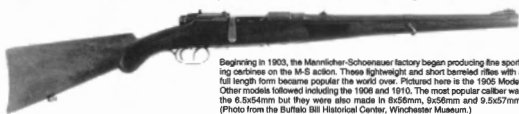
cartridges, but since Greece was such a small country, the 6.5 M-S cartridge never became a noteworthy military cartridge. It did, however, become a worldwide favorite sporting cartridge in the famous M-S sporting carbine, and it has been successfully used for taking all species of big game, including elephant.

The 6.5 M-S is also known as the 6.5x54 or 6.5x53 M-S. The "6.5" indicates the caliber in millimeters of .256"—the approximate bore size of the barrel. The "53" or "54" (the latter figure is most generally used today) is the case length in millimeters. Bullets are usually of .264" diameter to match the groove diameter of barrels made for this cartridge, which normally range from .266" to .268". M-S rifle barrels usually have a very fast rifling twist, one turn in 7.87".

The 6.5 M-S Greek military cartridge was normally loaded with a 159-grain full-jacketed round-nosed bullet, muzzle velocity about 2225 fps. Sporting loads, which were made in such countries as Austria, Germany, Great Britain, Canada and the U.S., were usually loaded with 150- to 160-grain round-nosed expanding-type bullets.

If you own a rifle in this caliber and want to shoot it, you surely can find an ammunition source by contacting dealers who sell imported ammunition. Check the "Directory of the Arms Trade" in *GUN DOGS* for the names and addresses of importers and manufacturers of ammunition. And when you shoot your rifle, save the empty cases because they can be reloaded. In the directory, you should also be able to find a commercial stock maker who can furnish semi-shaped/inletted stocks for the Mannlicher-Schoenauer.

The handloader will want to use Norma cases because they accept Boxer primers. Because the 6.5 M-S chamber has a very deep throat for the long-bulleted factory load, and the M-S action and magazine are made specifically for such a load, the handloader will have the best results with long and heavy 6.5mm bullets.



Beginning in 1903, the Mannlicher-Schoenauer factory began producing fine sporting carbines on the M-S action. These lightweight and short barreled rifles with a full length form became popular the world over. Pictured here is the 1905 Model. Other models followed including the 1908 and 1910. The most popular caliber was the 6.5x54mm but they were also made in 8x56mm, 9x56mm and 9.5x57mm. (Photo from the Buffalo Bill Historical Center, Winchester Museum.)



Italian Carcano Rifles

THE CARCANO BOLT-ACTION rifle was adopted by Italy in 1891 as her official military shoulder arm. Adopted with it was the 6.5mm Carcano cartridge, one of the first small caliber smokeless military cartridges to be used by a major military power. The Model 1891 Carcano rifle and its various versions, and the 6.5mm cartridge, were in continual production and use until Italy's defeat in WW II. No doubt several million of these Carcanos were made in this long period (about 54 years). Returning American servicemen brought many home as souvenirs, but this number was a mere drop of water in a tub compared to the countless thousands dumped on the U.S. military surplus arms market since the late 1940s.

The Carcano action was developed jointly by Lt. Col. Salvatore Carcano and Col. G. Parravicino, both employed in the Torino (Turin) Arms Factory in Turin, Italy. Perhaps most of these rifles and carbines were made in Terni, but they were also made in Turin, Brescia, and Gardone in government or privately owned arsenals. The action, a turnbolt repeater with dual front locking lugs on the bolt, was copied from the Model 89 Mauser, but made with a single column box magazine of Mannlicher design. As a result of the various names and places connected with these arms, they have been called the Parravicino Carcano, but they're now generally called the Mannlicher-Carcano, Italian Carcano, or Terni.

Carcano Markings

Markings are many and varied, and specific models are not always marked alike. The model designation is never stamped on the rifle, nor are the words "Carcano" or "Italy." Some receivers are entirely unmarked.

The serial number, usually beginning with one or two letters, may be stamped on the breech end of the barrel, on the receiver, or on both. The serial number, or any part of it, is seldom stamped on any other part of the rifle.

There is usually an assortment of inspector's and/or proof marks stamped on the barrel breech, receiver, and bolt. Often unclear, they're not really important.

The name of the manufacturer, and/or the city where the rifle was made, is usually stamped on the receiver ring or on the breech end of the barrel. The marking **TERNI** indicates manufacture there by the Italian Army small arms arsenal. The marking **RE TERNI** stands for *Regio Esercito Terni*, which means **ARMY, TERNI**. The marking "F.N.A. Brescia" stands for *Fabbrica Nazionale d'Armi* (National Arms Factory) in the city of Brescia. The marking **BERETTA GARDONE** means manufacture by P. Beretta Arms Factory in Gardone, V.T., Italy.

The year of manufacture of many Carcanos is often stamped on the receiver ring. On others the date of manufacture may be stamped on the barrel breech, such as 01 for 1901. Most rifles produced during the Fascist regime were also marked with a Roman numeral, such as XVI, indicating manufacture in the 16th year of the regime.

Many Italian rifles were re-marked; for example, some are found marked **SPECIAL-GUARD-BAYARIA**; others carry the letters **SA** within a rectangle, which means "Suomen Armeija" or "Finnish Army." The Firms obtained these rifles from Italy during WW II for defense against Russia. No doubt there are Carcano rifles and carbines with other markings unknown to me.

Various Carcano rifle and carbine models were produced. Since they're all based on the same action, I'll describe the principal models briefly.

The first model was the 1891 Carcano rifle, its 30.8" barrel adapted for a knife bayonet. Next came the M1891 Carcano carbine with a folding bayonet permanently attached to its 17.5" barrel, and the M1891 TS carbine with a 17.5"-plus barrel and detachable knife bayonet. There was also the Model 41 rifle with a 27" barrel. All of these were made only in 6.5mm caliber.

In 1938 Italy adopted a new cartridge of larger caliber—the 7.35mm Carcano. It was based on the same case as the 6.5mm Carcano cartridge but with the neck expanded to hold the larger 7.35mm bullet. The rifles chambered for this cartridge were the M38 short

rifle with a 21.1" barrel and detachable bayonet, and the M38 carbine with a 17.5"-plus barrel. Italy, however, soon became involved in WW II and could not make a complete change-over to the new caliber, so it was dropped in favor of the older 6.5mm. As a result, many M38 rifles and carbines made for the 7.35mm cartridge were rebarreled for the 6.5mm load.

W.H.B. Smith, in his *The Book of Rifles* says that some M38 rifles were made in 7.92mm caliber (8x57mm Mauser) for use by Germany during WW II.

The 6.5mm Carcano rifle barrels were made with progressive or gain twist rifling; that is, the rate of twist gradually increasing from breech to muzzle. At the breech the twist was about one turn in 19", increasing to about one turn in 8" at the muzzle.

The 7.35mm Carcano barrels were made with a uniform rate of twist, one turn in 10".

The Carcano Action

The Carcano is a relatively simple turnbolt, 6-shot repeating action having some Mauser and Mannlicher features, plus others found only in this action. Despite wide criticism leveled against it, the Carcano is a well designed and rugged action for military use since, presumably, the Italians did not have any major trouble with it or they would have changed the design.

The Carcano receiver appears to have started as a forging which was then milled and machined to final dimensions. The round receiver ring is quite large in diameter (1.335"), with only a small projection underneath to form the recoil shoulder. The inside of the receiver ring, threaded to receive the barrel shank, has a thin collar left in its center against which the breech end of the barrel abuts. The barrel breech is flat except for a thin ring which fits inside the receiver collar and around the head of the bolt. The rear of the receiver ring is milled to form locking recesses

(Pictured above) Model 38 Italian Carcano Short Rifle, caliber 7.35mm.

for the bolt lugs. There is more than ample metal at this point to securely support both locking lugs. In the lower left side, in the locking lug recess, a shelf of metal is retained which has a forward sloping surface. The angle of this surface matches a beveled corner on the left (upper) locking lug; on opening the bolt this arrangement provides the initial extraction camming power; on closing the bolt rapidly it helps to start the closing rotation of the bolt. The receiver walls behind the receiver ring are smaller in diameter than the ring; on the left side of the receiver there is a definite step, as in the large ring 98 Mauser action.

The left receiver wall is much higher than the right, and the high left wall lacks a thumb notch. A long opening is milled in the bottom of the receiver for the magazine. The rear half of this opening is wide enough to accept the cartridge clip, while the front half is only slightly wider than the body of the cartridge. The front end of this opening is sloped toward the chamber to form a loading ramp to raise and guide the cartridge from the magazine to the chamber. Cartridge feeding into the chamber is positive and reliable.

The receiver bridge is split or slotted at the top to allow passage of the bolt handle. The receiver ends in a top tang about 2.5" long.

The trigger mechanism is mounted below the receiver bridge and tang. The sear attaches to the receiver, pivoting on a pin crosswise through a hole in the bottom of the bridge. A projection (made separately, but more or less permanently pinned in place) on the rear of the sear projects upward through a hole in the tang into a groove which is milled out for the sear notch to engage the cocking piece when the bolt is closed. The sear is tensioned by a coil spring positioned between recessed holes in the front of the sear and receiver. The trigger, attached to the sear, pivots on a pin through the sear. The upper part of the trigger, which bears against the bottom of the receiver, has twin humps which produce the two stage pull.

The ejector is a collared pin positioned over and inside the rear spring and extending upward through a hole in the receiver. A long tapering groove is cut into the front half of the



Italian Model 91 Mannlicher-Carcano action (shown with loaded clip in place).

bolt body to allow the ejector to rise, as the bolt is opened, to contact the head of the cartridge or case and eject it from the action. This appears to be a very efficient, though simple, arrangement.

The bolt-stop is equally as efficient and simple as the ejector. It is a bar extending upward through a hole in the bottom right side of the receiver which projects into the right locking lug raceway in the receiver bridge. The bolt-stop is attached to an arm on the trigger. Pulling the trigger back moves the bolt-stop down so the bolt can be removed.

The bolt and bolt handle appear to have been machined from a one-piece forging, although the latter may have been permanently attached to the bolt by other means. The bolt handle is near the center of the bolt and, when the action is closed and locked, the heavy rectangular base of the bolt handle is forward of the receiver bridge, acting as a safety lug should the forward locking lugs fail. The shank of the bolt handle, round and quite thin, ends in a round grasping ball. On the Carcano rifles the bolt handle sticks straight out, but is bent down on the carbine.

The dual-opposed front locking lugs are quite large and solid; neither has any slots or holes. The bolt face is recessed for the cartridge rim, but the rim of the recess is cut away one-fourth of its diameter for the extractor hook. Another quarter is cut away beyond the bottom of the extractor hook to allow the

cartridge head to slip under the extractor hook when fed into the chamber from the magazine. This prevents double loading.

The one-piece spring steel extractor, about 2" long, is mortised into the front of the bolt. A projection under the front end of the extractor fits in a slot in the bolt, preventing the extractor from pulling out. Cartridges normally slip under the extractor hook when being chambered from the magazine. Closing the bolt on a cartridge that is chambered ahead of the extractor (as in single loading the rifle by dropping a cartridge into the chamber) is difficult because the extractor hook is not made to slip easily over the cartridge rim.

The major parts of the firing mechanism are the firing pin, coil mainspring, firing pin nut, cocking piece and bolt sleeve. In addition, there is a spring and plunger in the cocking piece, the purpose of which is to prevent the firing pin nut from turning. The mainspring is compressed between a shoulder on the one-piece firing pin and the bolt sleeve which is backed by the cocking piece. All are retained on the firing pin by the firing pin nut, which threads on the rear of the firing pin. A flat spot on the firing pin matching a similar spot in the cocking piece prevents either part from turning on the other. A shoulder at the rear end of the firing pin prevents longitudinal movement of the firing pin in the cocking piece when the firing pin nut is fully tightened.

The bolt sleeve is usually defined as that part of the action which holds the firing mechanism in the bolt. In the Carcano action the bolt sleeve does this, but it also performs the function of a safety. A small lug on the front part of the bolt sleeve slides into a groove and notch cut into the rear of the bolt body. When the action is cocked, the bolt sleeve is held forward by the lug engaging the notch, and heavy mainspring pressure holds it in this notch so that it rotates with the bolt. When the bolt is closed and the bolt handle down (it must be in this position or the rifle cannot be fired) part of the flange on the rear of the bolt sleeve is also engaged in a notch cut into the receiver tang. This keeps the bolt sleeve in place, and there is



Italian Carcano action, open.



Left side view of the Model 91 Italian Carcano action.

little chance of it being blown out even in the event of a severe primer rupture.

A deep cocking notch is cut into the rear of the bolt body, which the cocking cam on the cocking piece engages. The cocking cam, quite long, extends into the left locking lug raceway in the receiver bridge. When the striker is down, raising the bolt handle cocks the action.

To prepare the action for firing, the checkered safety wing on the bolt sleeve is positioned forward and to the right. To place the bolt sleeve (or safety—whatever you want to call it) in the "safe" position, it is pushed slightly forward and turned up. When this is done the bolt sleeve is partly released to move back against the cocking piece, relaxing the firing mechanism in the bolt. In this position the firing pin is held back, its tip held well within the bolt, so a blow on the cocking piece cannot fire the rifle. In this position the bolt is also locked, and cannot be opened.

To engage the safety it is necessary to grasp the bolt handle, while depressing and turning the safety (bolt sleeve), to prevent the bolt from opening. The bolt sleeve is under full mainspring tension and it is not easily operated. Moving the bolt sleeve on to "safe" calls for a strong thumb, but turning it again to the "fire" position is quite hard to do.

The action is securely held in the stock by two guard screws, these passing through holes in each end of the trigger guard/magazine, and threaded into the tang and receiver ring. Stock bushings (or spacers) are used with each guard screw. The very small recoil shoulder on the receiver would be entirely inadequate to absorb the recoil if inletted directly into the stock. In the Carcano action recoil is taken up by a clever T-shaped stock bushing and spacer through which the front guard screw passes. The top of the "T" is a heavy metal bar about 1.20" long and .40" deep, its top grooved to fit the small lug on the receiver. With this T-bushing snugly bedded into the stock, and anchored between the trigger guard tang and the receiver by the guard screw, action set-back in the stock is hardly

possible. In restocking this rifle I strongly suggest this T-bushing be used.

The trigger guard/magazine is made of a single piece of steel. The trigger guard bow is wide and heavy, the bow opening larger than needed. The thin-walled magazine box is an elongation of the guard bow bottom, thus extends well below the stock line. The single follower arm pivots on a pin through the lower front of the follower housing. It is given strong upward tension by a flat spring mortised in the follower housing. The follower housing closes the bottom front half of the magazine box and is in turn partly mortised in the magazine box and held in place by a screw. A special cartridge clip, holding up to 6 cartridges, must be used with the Carcano action if the rifle is to be shot as a repeater. The fully or partially loaded clip is inserted through the top of the open action, depressing the follower by the bottom cartridge. There is no top or bottom to the clip; it can be inserted either end first. When the clip is pressed down fully the spring-loaded magazine catch, located in the rear of the magazine box, engages it and holds it down. The bottom portion of the magazine box below the clip is open and when all the cartridges are fed out of the clip, it drops out. The fully or partly loaded clip can be released to pop up out of the open action by depressing the clip slightly and then depressing the magazine catch button in the front of the trigger guard.

There are no gas-escape holes in the receiver, and only one small hole is provided in the bolt near the front end. When the bolt is closed this hole opens into the right locking lug race-

way in the receiver ring. Any gases escaping through this hole would be directed backward alongside the bolt. This provision is sufficient unless the rifle is fired from the left shoulder. To make the action safer there should be a hole in the left side of the receiver ring to coincide with the under-cut in the bolt face recess. Without this hole any gases that got into the left lug raceway would surely be felt by the shooter.

Takedown and Assembly

Check to make sure the rifle is unloaded. To remove the bolt raise the bolt handle, hold the trigger back and pull the bolt from the receiver.

To disassemble the bolt, first rotate the cocking piece one-quarter turn clockwise; with the thumbnail depress the firing pin nut plunger and unscrew firing pin nut; the cocking piece can now be pulled off the firing pin. Next, depress bolt sleeve (safety) slightly and rotate it a bit clockwise, allowing it to come back. Do this again and bolt sleeve, firing pin, and mainspring can be removed from the bolt. Remove the firing pin nut plunger by driving out the cross pin. Remove the extractor only if necessary. It is removed by raising the hooked end with a screwdriver until it can be moved forward. Since the stem of the extractor is usually wedged very tightly into the dovetail groove in the bolt, it may be necessary to drive the extractor forward with a pointed tool while the hook end is held up. Reassemble in reverse order.

To take the barrel and action from the stock remove barrel bands and the two guard screws. With barrel and action removed, the rear, rear spring, ejector, bolt-stop, and trigger can be removed by driving out the rear and trigger pin.

Pull trigger guard/magazine from the stock. Turn out the clip latch screw, remove the clip latch and spring. Turn out the follower housing screw, drive the housing forward to remove it. Depress the follower arm fully, insert a screwdriver blade in the slots in the sides of the housing to hold the follower spring down, and remove the follower pin and follower. Pull the screwdriver out and the follower spring can be removed. Reassemble in reverse order. Do not attempt to remove the barrel unless proper tools are available.

Carcano Action Strength

Many Carcano rifles may not be well finished compared to M91 Mausers, but they're

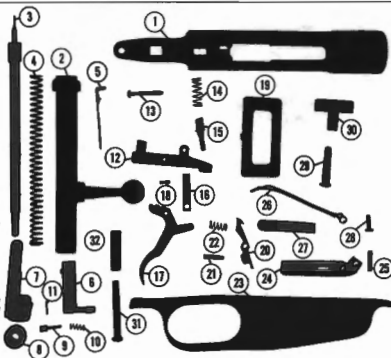


Top view of the Model 91 Italian Carcano action. The jeweling on the bolt is not the original finish.

PART I: Military Rifles & Actions

Parts Legend

- 1 Receiver (top view)
- 2 Bolt
- 3 Firing pin
- 4 Mainspring
- 5 Extractor
- 6 Bolt sleeve/safety
- 7 Cocking cam
- 8 Firing pin nut
- 9 Firing pin nut lock plunger
- 10 Firing pin nut lock plunger spring
- 11 Firing pin nut lock plunger pin
- 12 Seer
- 13 Seer pin
- 14 Seer spring
- 15 Ejector
- 16 Bolt-stop
- 17 Trigger
- 18 Trigger pin
- 19 Cartridge clip
- 20 Cartridge clip latch
- 21 Cartridge clip latch screw
- 22 Cartridge clip latch spring
- 23 Trigger guard/magazine
- 24 Follower housing
- 25 Follower housing screw
- 26 Follower arm
- 27 Follower arm spring
- 28 Follower arm pin
- 29 Front trigger guard screw
- 30 Front trigger guard screw T-bushing
- 31 Rear trigger guard screw
- 32 Rear trigger guard screw (stock) bushing



Italian Carcano Model 91

Dimensional Action Specifications

Weight	45 oz.
Overall length	8.625"
Receiver ring dia.	1.335"
Bolt body dia.	.680"
Bolt travel	4.140"
Striker travel	.540"
Guard screw spacing	7.84"
Magazine well opening	
Length	3.075"
Rear width	.565"
Front width	.455"
Bolt face recess	
Depth	.110"
Dia.	.450" (Approx.)

Specifications of the Italian Carcano Youth Carbine Rifle:

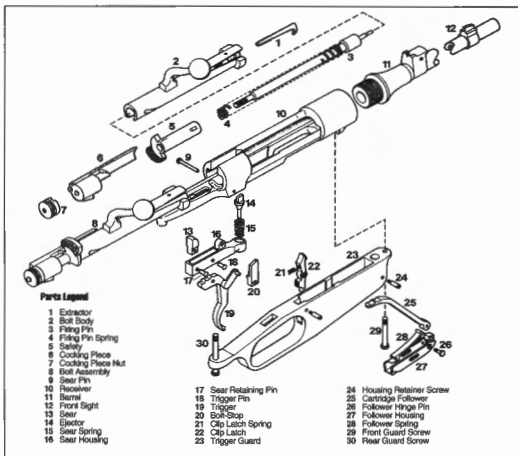
Weight	.3 lb., 10 oz.
Overall length	.30"
Barrel length	14.575"
Action:	
Weight	1 lb., 7 oz.
Length	6.75"
Bolt body dia.	.547"

General Specifications

Type	Tumbolt repeater.
Receiver	One-piece machined steel forging; slotted bridge.
Bolt	One-piece, with dual-opposed forward locking lugs. Base of the bolt handle serves as safety lug.
Ignition	One-piece firing pin and coil mainspring. Cocks on bolt opening.
Magazine	Single column, non-detachable six-shot box magazine. Special clip is required to load and hold cartridges in magazine.
Trigger	Non-adjustable, double-stage military pull.
Safety	Combined with the bolt sleeve, 90° swing from right to up. When up, safety locks bolt and releases firing pin.
Extractor	One-piece spring type recessed in front of bolt.
Bolt-stop	One-piece, connected to, and released by trigger. Stops bolt by contacting right (lower) locking lug.
Ejector	Plunger type located in receiver bottom.

certainly better than most of the many Japanese Model 99 rifles I've seen, and far better than most WWII M98 Mausers. Carcano receivers are not always smoothly polished, and some concealed parts show no polish at all, but the bolts are generally well-machined and smooth. The receiver and bolt appear made of good steels and to be properly heat treated. Although the 6.5 and 7.35 Carcano military cartridges are only loaded to a maxi-

mum breech pressure of less than 38,000 psi, I believe Carcano actions are strong and safe enough to handle heavier loads. The 6.5 Mannlicher-Schoenauer cartridge is generally loaded to 40,000-45,000 psi and, in those 6.5 Carcano rifles rechambered for this cartridge, the actions seem to take these higher pressures in stride. However, in handloading Carcano cartridges I advise keeping loads moderate, not exceeding 40,000 psi.



The Carcano Clip

As noted before, a special clip must be used if the Carcanos are to function as repeaters. These clips, made of steel or brass, hold 6 rounds. Two crimped-in ridges, inside the back part of the clip, engage in the extractor groove of the cartridges to hold the rounds against the clip rear.

The receiver and the magazine box are milled out to accept the loaded clip, with shoulders left so it cannot move forward. This also holds the cartridges securely in the magazine so they cannot move forward from recoil. The ridges in the clip extend nearly to each end, allowing just enough room for cartridges to be inserted and removed (or fed out via the bolt) when the head of the cartridge is pressed against the curved lips of the clip. This is a good arrangement: the clip is easy to load; the fully

loaded or partly loaded clip is easily inserted into the action (from the top with the bolt open); it is easily removed; feeding is in a straight line and reliable. The drawbacks are these: when the clip is emptied it drops out and is easily lost; without the clip the rifle can only be used as a single shot. Clips are still readily available at this writing, and both Italian 6.5mm and 7.35mm cartridges use the same clip.

Converting the Carcano

Carcano rifles are among the least desirable of all modern military bolt actions to remodel or sporterize, nor is the Carcano action a very good choice on which to build a rifle. I've already mentioned a couple of poor and undesirable features of the Carcano: the very awkward and hard-to-operate safety, and the necessity of using a clip. There are many more. The slotted receiver bridge prevents the

installation of a regular receiver sight. No commercial replacement safety is made for this action, and there is no practical way the military safety can be altered to improve it. No replacement trigger is made for the action although the military trigger can be improved. The box magazine extends below the stock and it isn't feasible to make it flush with the stock. The clip is too narrow to accept standard 30-06 head size cartridges, so cartridge choice for rechambering or rebarreling is very limited.

None of these objections has really bothered or stopped the enterprising amateur gunsmiths from tackling them and working the rifle over into a sporter.

Rebarreling to another caliber, if the rifle is to remain a repeater, is also limited.

Even as a single shot, cartridge choice is limited because the bolt head and extractor



Bolt head of the Italian Carcano.

are not easily altered.

The only satisfactory remodeling of the Carcano carbine consists of starting with one having a good bore, then limit the work to putting on new sights, refinishing the metal, remodeling the issue stock or installing a new one. A good rear sight choice is the Williams Guide, adjustable for windage and elevation. This should be paired with a new front blade or bead sight mounted on the Williams Shorty ramp base. Mounting a scope on Carcanos is just not practicable.

8.5 & 7.35 Carcano Cartridges

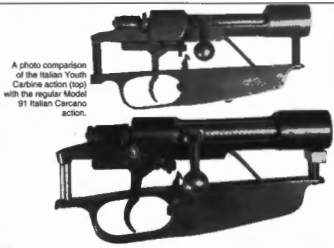
The 6.5 military round was normally loaded with a 162-grain round-nosed, full-jacketed bullet, muzzle velocity about 2300 fps. It was a good military cartridge, comparing favorably with other 6.5 military loads.

The commercial Norma 6.5 Carcano is loaded with a 156-grain soft-point, round-nosed bullet, 2000 fps muzzle velocity. Although this seems a very mild load it has ample power to take deer-sized game to about 200 yards. It could be handloaded safely to higher velocities with the same weight or lighter bullets. Because of the deep throat in the Carcano barrel, best results will be had with bullets of at least 130 grains. Poor accuracy may result with lighter bullets.

The usual 7.35 Carcano military cartridge carried a 128-grain semi-pointed, full-jacketed bullet, its velocity about 2482 fps; normal bullet diameter is .298"-.300".

Italian Youth Carbine

This title—the name it commonly goes by



A photo comparison of the Italian Youth Carbine action (top) with the regular Model 91 Italian Carcano action.

in English-speaking countries—describes one of the most unusual military arms of the WW II period. Mussolini and the Fascist Party leaders—aping the Nazis—wanted to start training Italian boys at an early age (probably at about 6) and a special small-sized arm was developed and manufactured for this purpose alone. The Youth Carbine is an almost identical but scaled-down version of the regular Model 91 Carbine with folding bayonet.

It is believed that about 30,000 of these small Carcano carbines were made between 1930 and 1940. American servicemen in Italy during the war took a number of these carbines home, but they're quite scarce today.

The IYCs are marked F.N.A. BRESCIA on the receiver for *Fabbrica Nazionale d'Armi*. Their serial number usually begins with a letter. The year date of manufacture is also stamped on the receiver as well as the Roman numeral(s) indicating the Fascist regime year. On the carbine illustrated a rectangular stamping, atop the receiver ring, shows an insignia or crest with the Roman fasces.

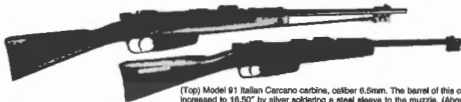
The official Italian designation for the Youth Carbine is *Moschetto Regolamentare Ballila Modello 1891 Ridotto*. Translated, this

means "Ballila Regulation Musket Model 1891 Reduced." "Ballila" was the name of the Italian Fascist Youth Party.

The IYC was used for drill training only, since only blank ammunition was made for them, and the tip of the bayonet dulled. Some are smoothbored, others have a rifled bore of 6.5mm caliber. The blank cartridge is about the size of the 222 Remington, but has a longer neck ending in a folded crimp. The chambers are reamed minus any neck or throat; the neck of the blank cartridge is made small enough to enter directly into the bore, whether rifled or not. It is thought that perhaps IYCs with rifled barrels were made from discarded Model 91 Carcano barrels.

The action of the IYC is a regular little gem, and just over half the weight of the regular M91 and M38 Carcano actions. In every detail it is similar to the larger action. I don't believe it is made of good enough steel to be used with a modern bullet cartridge, otherwise this miniature action would be just the right size for the 222 Remington.

The blank cartridges made for these carbines are extremely scarce, much more so than the carbines, and are prized collector items.



(Top) Model 91 Italian Carcano carbine, caliber 6.5mm. The barrel of this carbine has been increased to 18.50" by silver soldering a steel sleeve to the muzzle. (Above) Italian Youth Carbine (minus the folding bayonet).



Japanese Arisaka Rifles

PRIOR TO WWII there were very few Japanese military rifles in the United States, apart from a small number of the older 11mm Japanese Murata rifles in various private and museum collections. Beginning with the bombing of Pearl Harbor on December 7, 1941, and ending with signing of the peace treaty on board the battleship *Missouri* in Tokyo Bay on September 2, 1945, our servicemen went through untold hardships in the Pacific area to win that peace. Perhaps because of these hardships, regulations regarding sending or taking home captured rifles for souvenirs were kept lenient, and largely overlooked by our military officers, so that by the end of the war Japanese rifles had become commonplace items.

Before and during the first part of the war not much was known about Japanese military rifles and cartridges. At that time gun writers generally scoffed at both the rifles and the cartridges, berating the rifles generally as junk and the 6.5mm cartridge as vastly inferior to our 30-06. This was unfortunate, since many servicemen reading these reports before they were inducted for duty in the Pacific area, didn't have the respect they should have had for their opponents' weapons. I could cite a couple of instances of this from among my own acquaintances, but suffice it to say they soon learned better, and it was not long before the "puny" 6.5mm Japanese cartridge, and later the 7.7mm cartridge, were rated among the world's best military cartridges.

It took somewhat longer, however, to establish the fact that the Japanese rifles firing these cartridges were also good. The Japanese knew this, of course, but it took some convincing to change the minds of some of our gun experts that the Japanese Arisaka rifles were good. The fact is, we discovered that the Type 38 and 99 Arisaka actions were perhaps the world's strongest and safest bolt actions, and that it is almost impossible to blow them up.

Development

Japan's first important breech-loading military shoulder arm was the Type 13 (1880)

Murata chambered for the 11mm Murata cartridge. A single shot bolt-action rifle, it was later modified and made as a repeater by installing a feed mechanism and a tubular magazine in the forend. Then, in 1887, Japan adopted an 8mm cartridge (8mm Japanese Murata) and used it in a further modification of the Murata rifle, again with a tubular magazine.

In Japan, as was done in many other countries, a commission was appointed to study, develop, test and adopt new military arms. In the late 1890s the superintendent of the Tokyo Arsenal, Col. Nariaki Arisaka, headed such a commission, which in 1897 recommended the adoption of a 6.5mm cartridge and a new rifle to handle it. The rifle adopted was the Type 30 (1897), the cartridge a semi-rimmed, bottlenecked, smokeless-powder one now commonly known as the 6.5mm Japanese. Although Col. Arisaka probably had little to do with the designing of either the cartridge or the rifle, his name is usually given to them, as well as to later versions. The Type 30 was a further development of the old Murata design, but with a staggered-column box magazine, a separate bolt head and a finger-hook safety. First made in about 1889, a still further development came around 1902 with the adoption of the Type 35 (1902) Arisaka rifle, of which only a limited number were made.

The Type 38 Arisaka

Having by this time perfected the 6.5mm cartridge, the commission, still under Col. Arisaka, continued looking for a better action. By 1905 they had found it. The rest of this chapter is about the Type 38 action, its modifications and the rifles built on it.

Before going into details of the action, I'll briefly describe the rifles and carbines based on this action the Japanese adopted in 1906, all of them chambered for the 6.5mm cartridge.

1. Type 38 (1905) Rifle. About 9.5 pounds, 31.25" barrel, 50.25" overall. The standard Japanese infantry shoulder arm from 1906 to 1940.

2. Type 38 (1905) Short Rifle. About 8.5 pounds, 25.25" barrel, 44.25" overall. Not many made.

3. Type 38 (1905) Carbine. About 7.75 pounds, 19" barrel, 38" overall. The standard carbine.

4. Type 97 (1937) Sniper Rifle. Same as the Type 38 rifle but fitted with a short 2.5x scope attached to the left side of the receiver; the detachable mount holds the scope off-set to the left to allow loading the magazine with a stripper clip. This model has a bent down bolt handle.

The above rifles have two-piece, pistol grip stocks. The bottom piece of the buttstock, a separate piece of wood, is glued to the top part. All have a one-piece cleaning rod in the forend and are made to accept a bayonet. All have sliding breech covers, and all but the sniper rifle have straight bolt handles.

5. Type 44 (1911) Cavalry Carbine. About 8.75 pounds, 19" barrel, 38.25" overall. Straight bolt handle, sliding breech cover and a non-detachable folding bayonet.

The 6.5mm rifles and carbines of late manufacture usually have the bore and bolt face chrome-plated.

The Type 38 Action

A modified Mauser design, the Type 38 action has several features distinctly of Mauser design, but a couple of others which were new and entirely Japanese designed. These new features make this action different from any other military bolt action made before or since. In some ways it is a crude action, not being very easy to operate, but it is simple and extremely strong.

The receiver is a round steel forging of the same diameter for its entire length. The front is bored out and threaded to accept the barrel shank. There is no collar inside the receiver ring as in the Model 98 Mauser action; instead, a collar forms part of the breech end

(Pictured above) 6.5mm Japanese Arisaka Type 38 (1905) carbine.

PART I: Military Rifles & Actions



6.5mm Japanese Arisaka Type 44 (1911) Cavalry carbine, a folding bayonet recessed in the bottom of the barrel.

of the barrel, this becoming a shroud for the front end of the bolt. More on this later. Ample-sized locking shoulders are left in the rear of the receiver ring, in which the locking lugs on the bolt engage. The forward corners of these shoulders are beveled off to form inclines, so that the final closing draws the bolt forcibly forward.

The top and right side of the receiver center are milled away to form an opening, leaving the left receiver wall quite high. To the rear of this opening is the receiver bridge, of the same diameter as the receiver ring. Stripper-clip slots are milled into the front of the solid bridge. Raceways milled in the left

ing lugs lie ahead of the receiver locking shoulders when the bolt is closed, holding the cartridge securely in the chamber. The right (bottom) lug is solid, the left (top) lug is partly slotted in front to allow passage of the ejector, this slot extending partly into the bolt-face recess.

There is also an auxiliary lug (not a locking lug) just to the rear of the left (top) locking lug. This acts as an activator for the ejector, and as the bolt-stop lug when it engages with the bolt-stop when the bolt is opened. An inclined slot in the rear of this lug prevents the bolt hanging up on the ejector, and trips the ejector when the bolt is fully opened.

bolt the cartridge or cartridge case will remain in place until forced out by the ejector.

The extractor, of Mauser design, is a long one-piece spring affair held on the bolt body by a collar around the bolt. Longitudinal movement of the extractor is prevented by a lip under the front part of the extractor engaging in a groove in the front end of the bolt. The extractor is non-rotating; that is, while it does rotate on the bolt, it does not rotate in the receiver or on the cartridge.

The Type 38 action has the simplest safety and firing mechanism of any centerfire bolt action known to me. Not counting the trigger, sear parts, receiver or bolt, the firing and safe-



6.5mm caliber Japanese type "I" rifle, made in Italy for Japan.

receiver wall and in the right of the receiver ring and bridge allow passage of the locking lugs and extractor. The rear part of the bridge has an L-shaped slot milled from the top rear to the right front for passage of the bolt handle. The forward side of this slot, beginning at the corner, is angled slightly forward; this provides the initial camming power for extraction when the bolt is opened, and helps to rotate the bolt when it is closed smartly.

The bolt and bolt handle are of one-piece construction. The straight bolt handle, at the rear of the bolt, has a large oval-shaped grasping knob. The base or root of the bolt handle is squared. The large dual-opposed front lock-

The bolt face is recessed to about the depth of the cartridge rim. Part of this rim recess is undercut to allow the cartridge head to move up and under the extractor hook when the cartridge is fed from the magazine, as in the Mauser 98 and Model 1903 Springfield actions. This prevents double loading, since any cartridge bolt-fed into the chamber from the magazine will be extracted and ejected upon opening the bolt, even though the bolt was not fully locked during this procedure. The lower left edge of the rim recess is slightly higher than the rest of the rim and is slightly undercut. This affords extra bearing surface for the cartridge rim, from the slight side pressure of the extractor, so that on opening the

ty mechanism consists of only three parts. This design has its virtues and drawbacks, as we shall see, but it is a very reliable and effective arrangement for a military rifle.

The bolt body is drilled from the rear to accept the one-piece hollow striker (call it the firing pin if you like) with its integral firing-pin tip in front and its cocking cam (sear) on the rear. The coil mainspring fits into the hollow part of the striker. The third part of the mechanism is the safety, although it has several other functions.

The safety is a large one-piece affair comprised of a cap to which is permanently attached a stem projecting forward from its hollow center. This stem extends into the hol-



7.7mm Japanese Arisaka Type 99 (1939) rifle, shown with the breech cover and monopod, but minus cleaning rod.



7.7mm Japanese Arisaka Type 99 (1939) long rifle. This version of the Type 99 is relatively scarce.

low striker to compress the mainspring. The safety is held on the rear of the bolt by a lug inside of the cap engaging over a ridge on the outside rear of the bolt body. The safety can be quickly and easily removed from the bolt by pressing it forward and rotating it clockwise about one-quarter turn. The safety is linked to the striker by a small stud on the safety stem engaging in a matching groove milled inside the striker. The safety is linked with the receiver when it is engaged by a small stud on the outside of the safety cap engaging in an L-shaped groove in the bottom rear of the receiver. In all, there is a complicated hook-up between safety, striker and

serrated and made with a small bump so located that it is up when the safety is engaged.

The trigger system follows the Mauser M93-96 design (later copied in the Pattern 14 and 1917 Enfield actions). It consists of a sear pivoted on a pin through a small lug on the bottom of the receiver. The sear projection on the rear of the sear protrudes through a hole in the receiver and engages the cocking cam on the striker when the bolt is closed. The striker is thus cocked on the forward or closing motion of the bolt. A pin riveted on the front of the sear projects upward through another hole in the receiver, which prevents the trig-

until the base of the bolt handle contacts the receiver; release the trigger; lower the bolt handle by striking it smartly with the palm of the hand. This should only be done on an empty chamber.

The bolt-stop and ejector assembly is built into a long narrow integral housing which projects from the left of the receiver bridge. The bolt-stop, of Mauser design, is held in this housing and pivots on a screw through the underside of the rear end of the housing. It is tensioned by a flat spring locked to the front end of the bolt-stop. The ejector, positioned in a slot in the center of the housing, pivots on a separate screw, also turned in through the



Type 2 (1942) Japanese Arisaka takedown paratrooper rifle.

bolt, and also with the receiver when the safety is engaged, certainly the result of someone's ingenuity. The lug on the outside of the safety cap, engaged in the groove in the receiver, prevents the safety from rotating when the bolt handle is raised or lowered. The rear surface of the cap-like safety is knurled in a circular pattern to prevent it twisting under thumb or palm pressure when it is engaged by pressing it forward and rotating it one-eighth turn clockwise, or disengaged by again pressing it forward and rotating it in the opposite direction. The safety can only be engaged when the striker is cocked, and when engaged it locks both the striker and the bolt. The outside edge of the safety cap is usually

ger being pulled to release the striker, except when the bolt handle is straight up, the bolt then entirely unlocked, or when the bolt handle is fully lowered and fully locked. In these positions two narrow grooves in the bolt body align with the pin. The sear spring is compressed over this pin between the sear and receiver. The trigger, which pivots in the sear on a rivet, has two bumps where it contacts the bottom of the receiver and these bumps provide the usual two-stage military trigger pull.

The striker can be lowered on closing the bolt as follows: push the bolt forward until the striker contacts the sear; pull the trigger to allow bolt and striker to be moved forward

underside of the housing. There is no ejector spring. The ejector is activated by action of the auxiliary bolt-stop lug on the bolt which, on opening the bolt, pivots the front end of the ejector to the right, in the groove provided for it in the bolt head.

An opening is milled into the bottom of the receiver for the magazine opening. Integral lips or cartridge-guide ribs at the top of the opening hold the cartridges in the magazine and guide them into the chamber. The magazine, a thin piece of sheet metal folded to form a box, is reinforced at each end with a heavier piece of metal welded in place.

The milled steel trigger guard is combined with a magazine plate which has an opening



Japanese Type 38 6.5mm Training rifle, this specimen with receiver and some of its action parts made of cast iron.

to surround the bottom of the separate magazine box. A milled steel floorplate covers this opening. A lip on the front of the floorplate, engaging a groove in the trigger plate and a latch arrangement built into the front part of the trigger guard bow, holds the floorplate in place. Depressing the latch in the guard bow releases the floorplate.

The ends of the W-shaped magazine follower-spring fit into mortises cut into the bottom of the steel follower and floorplate. The top surface of the follower has a rounded ridge on its left side which forces the cartridges to assume a staggered position when they are inserted into the magazine. The rear edge of the follower is square and, when the magazine is empty, the follower rises high enough to halt the forward motion of the bolt, indicating to the shooter that the magazine is empty.

The action is held in the stock by the two guard screws through the ends of the trigger guard and threading into the receiver. The front guard screw passes through an integral stud on the floorplate and threads into a similar stud on the bottom of the receiver. The receiver has no recoil shoulder. The recoil is transferred to the stock by a recoil block which fits over the studs and between the receiver and the floorplate. This recoil block has one flat side (inletted into the stock so the flat side is to the rear) which has enough area to absorb the recoil and prevent set-back of the action in the stock.

The Type 38 Japanese action was designed to eliminate one of the major weak points found in most modern military bolt-action rifles—the wrist or grip of the stock. In the



Arisaka Type 38 (1905) 6.5mm action, minus breech cover.

Type 38 action strengthening the grip area was done with tangs connected to the receiver and trigger guard. The upper tang, made as a separate part, was milled and joined to the receiver to act as a solid extension to the receiver when the action is in the stock. The separate lower tang was also mated to the rear of the trigger guard. The rear guard screw passes first through lower tang, then through the trigger guard and threads into a square stud in the receiver. The ends of the tangs are connected by a long screw through the top tang and stock which threads into the lower tang. The tangs extend well past the smallest part of the grip, greatly strengthening the weakest area of the stock.

All bolt-action rifles are more or less open to the elements. Dust, mud, sand, water and sleet can get into the action through the top receiver openings and can cause problems.

Japanese designers, evidently familiar with this shortcoming, decided that the action

should be covered as much as practicable. The result was a very simple arrangement. Two longitudinal narrow grooves were cut into the receiver, one high on the left receiver wall, the other on the low right receiver wall. A curved strip of spring-tempered sheet metal, its edges folded in, was made to fit over the receiver and slide in the grooves. The bolt handle projected through a hole in the rear of this cover allowing the bolt handle to be raised and lowered. The bolt pulls the cover backward and forward with it as the action is opened and closed. This cover did effectively close the main receiver opening, but it still left a big opening around the base of the bolt handle where dirt could get in. The action was more difficult to operate with the cover in place than with the cover removed. Since many captured rifles were minus their breech covers, it seems that some Japanese soldiers discarded them.

Ample provision was made in the Type 38



Type 38 Japanese 6.5mm action, open.



Left side of the Type 38 Arisaka action.

Arisaka action to allow powder gases to escape harmlessly in the event of a ruptured case head or pierced primer. Two small holes in the top of the receiver ring provide vents for any gas escaping into the locking-lug recesses. A single large oblong hole in the bottom of the bolt, just behind the locking lug raceway, allows gas to escape into the left locking lug raceway and thence to the auxiliary lug opening in the top of this raceway, just to the rear of the receiver ring. Should any gas be deflected by the bolt stop lug, and if any got beyond this point the safety would deflect it from the shooter's face. Should a large volume of gas get inside the bolt through the firing pin hole, all of it could not escape through the large vent in the bolt. It would expand into the inside of the hollow striker, but it would not reach the shooter because of the solid safety cap.

Type 98 Arisakas

In the late 1930s Japan was preparing for war. Type 38 Arisaka rifles were good, and so was the 6.5mm cartridge, but measures had to be taken to speed up production of the rifles and for several reasons a larger caliber was also desirable. Thus, in about 1938, steps were taken to modify the Type 38 (1905) action for easier, faster, less costly manufacture. The Type 99 (1939) Arisaka action was the result. At the same time they adopted a new cartridge, commonly known as the 7.7 Japanese or 31-caliber Japanese.

Here is a brief description of the 7.7mm-caliber rifles and carbines based on the 99 action, or on further modifications of it.

1. Type 99 (1939) Long Rifle. About 9 pounds, 31.4" barrel, 50" overall.

2. Type 99 (1939) Short Rifle. About 8.5 pounds, 25.75" barrel, 44.25" overall. The standard Japanese infantry rifle used during WWII.

3. Type 99 (1939) Sniper Rifle, same as number 2 above except fitted with a 2.5x scope with a detachable off-set mount. Bent down bolt handle.

4. Type 99 (late version) Short Rifle, same as number 2 above but more cheaply made. Identifying features are: wooden buttplate, fixed aperture rear sight, no model markings. See text for specific details of this and the paratroop rifles.

5. Type O Paratroop Rifle. About 8.75 pounds, 25.75" barrel, 44.25" overall. Very rare model.

6. Type 2 (1942) Paratroop Rifle. About 9 pounds, 25.9" barrel, 44.25" overall.

The main identifying features of all rifles based on the Type 99 action are the stamped trigger guard, hinged magazine floorplate, and lower tang extending below the pistol grip. Type 99 Long, Short and Type 2 Sniper rifles usually had chrome-plated bores and bolt faces, and all except the sniper model had straight bolt handles. Sliding breech covers were also standard.

The Type 98 Action

Just as the 1903A3 Springfield action was a modified version of the 1903 Springfield action to make it easier to manufacture, the Japanese 99 action bore the same relationship to the earlier Type 38 action. In neither case did this result in the action becoming less reliable nor weaker. Although the quality of the finish suffered, the modified Springfield and Arisaka actions were unaffected as far as military use was concerned.

The following are the most notable outward changes and modifications made in effecting the change over from the Type 38 (1905) 6.5mm action to the Type 99 (1939) 7.7mm action:

1. The separate recoil block was eliminated; the 99 receiver was made with an integral recoil lug of ample size, which was an improvement.

2. Instead of milling an L-slot in the receiver bridge for the bolt handle, most of the metal below this slot was cut away on the 99 receiver. This still left enough metal for a safety lug for the bolt handle in the event the front locking lugs should fail.

3. The integral bolt-stop housing on the



Top view of the Type 38 Arisaka action. Note twin gas-escape holes in the receiver ring, the Japanese Imperial seal and other Japanese markings on the receiver ring, the clip-charger slot in the receiver bridge, the L-shaped slot for the bolt handle, and the oval grasping ball on the straight bolt handle.

receiver was replaced by a copy of the Mauser bolt-stop and ejector. The bolt-stop, attached to a lug on the receiver, is held in place by a pointed screw turned in from the top, with the ejector pivoting on this same screw. The ejector is tensioned by a separate small spring wedged under the heavier bolt-stop spring mortised in the bolt-stop.

4. The auxiliary lug and the left (top) locking lug are milled entirely through for the ejector.

5. Sheet metal stampings were used for several parts on the 99 action. These include the upper tang, lower tang and trigger guard bow, magazine floorplate and floorplate latch.

6. The magazine floorplate is hinged to the front of the magazine plate.

7. The 99 tangs were made longer to fur-

ther strengthen the grip area of the stock. The non-detachable lower tang extends over the end of the pistol grip.

8. Generally, the safety cap of the 99 action had a shallow groove cut into its outside edge instead of having a hump. The outside edge was usually serrated and sometimes the rear surface was not knurled or checkered.

9. Only a single gas port was made in the 99 receiver ring.

10. The barrel shank threads were changed; see the barrel shank drawings elsewhere in this book.

11. Other minor changes were made in the 99 action to adapt it to the 7.7mm cartridge and to facilitate manufacture. The magazine box and well were made slightly longer and the magazine well made slightly wider. The cut for the extractor inside the receiver ring was generally milled entirely through to the front edge of the receiver and through the threads for the barrel shank. Some milling cuts in the striker were made from the outside and entirely through the striker wall, instead of making the cuts only in the inside. The outside of the extractor was made flat instead of rounded.

No changes were made in the breeching method. The bolt remained unchanged except as noted above and the same trigger and safety systems were used. As can be expected, 99 actions were not finished as well as 38 actions, with the quality of the outside finish getting worse each succeeding year. By 1944, shortly before the 99 Arisaka went into production, no attempt was made to smooth fin-



Type 99 (1939) Japanese 7.7mm Arisaka action, minus breech cover.

ish such parts as the trigger guard, floorplate, extractor and upper tang.

The 1945 Action

By 1944 Japan was sorely pressed in her efforts to manufacture enough small arms for the expected homeland defensive operations. Her "last ditch" rifle was the Type 99 (1944 or 1945) version. It was made as quickly and as cheaply as possible and still be usable for serious warfare. Outwardly, this hastily made rifle was the same as the regular 99 (1939) version except for its finish, buttplate and rear sight. Its rear sight was merely a sheet metal aperture affixed to the barrel, the buttplate a thin piece of wood fastened to the stock with a few brads. As for the rifle's finish, the word "yough" best describes it. On several of these rifles I've owned and examined, the receivers were not too bad, but the bolts appeared to be rough undersized forgings with only enough machining done to make them work. Safeties were unfinished, with the stem roughly weld-

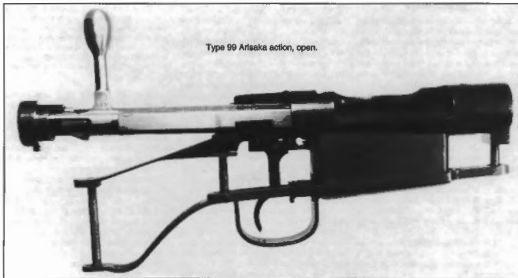
ed to the cup; this same type of safety was also used on the regular 99 (1939) versions of late manufacture. Although these rifles were fully suitable for service, they were crude. No effort was made to mark the receiver for type, but the Imperial seal was usually stamped on them.

Takedown and Assembly

First make sure the chamber and magazine are empty.

Type 38: Raise the bolt handle, pull it back as far as it will go, then swing the bolt-stop to the left until the bolt can be fully withdrawn. The bolt can be replaced by pushing it forward in the receiver. In replacing a bolt with a sliding breech cover, the cover must be aligned with the grooves in the receiver at the same time the bolt is inserted.

To remove the firing mechanism, grasp the bolt with one hand and, with the palm of the other hand, depress the safety as far as it will go, then turn it clockwise about one-quarter



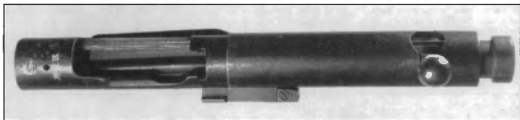
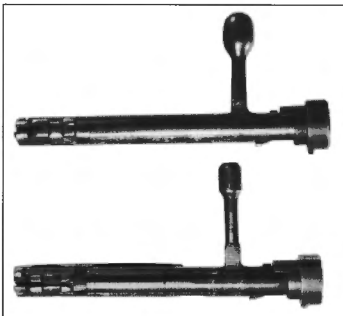
Type 99 Arisaka action, open.

turn or until it is released. Safety and striker can then be removed from the bolt and the mainspring removed from the striker. Reassemble by inserting mainspring in the striker, inserting the striker in the bolt with the cocking cam positioned in the shallow cam notch, then insert the safety by starting it with the hump positioned slightly clockwise of the bolt handle. Push the safety forward as far as it will go and then turn it counterclockwise as far as it will go. When assembled, the lug on the bottom of the safety must align with the cocking cam, otherwise the bolt cannot be inserted into the receiver.

Remove the extractor by turning it on the bolt so it covers the gas vent and then push it forward. Replace in reverse order. Do not remove extractor collar unless absolutely necessary.

(Above right) Bolt from the Type 38 Arisaka. (Below right) Bolt from the late Type 99 (1945) Arisaka. Note smaller, cylindrical-shaped grasping ball on this bolt, compared to the larger oval-shaped ball on the Type 38 bolt.

(Below) Top view of the Japanese Type 99 action. The action shown with breech cover and bolt open.



Receiver ring markings on the Type 38 Japanese action (right), and on the Type 99 (far right). When the Japanese Imperial seal is entirely intact (not partially or entirely ground away) it means that the rifles were captured. Surrendered Japanese rifles generally have the seal ground off.

Remove the magazine floorplate, follower and follower spring by depressing the floorplate latch in the trigger guard bow.

To remove barrel and receiver from the stock, first remove the barrel bands and turn out the two guard screws and the tang screw. The barrel, receiver and upper tang can then be lifted from the top of the stock and the lower tang, trigger guard and magazine box can be removed from the bottom of the stock. Remove the magazine latch by driving out its pin, then remove the latch plunger and spring.



Remove the trigger and sear by driving out the sear pin. The trigger pin is riveted in, but can be driven out with a drift punch if necessary.

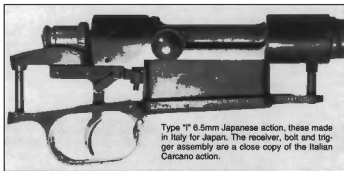
Remove the bolt-stop by turning it out, and pulling out the rear screw under the bolt-stop housing. Turn out the ejector screw to remove the ejector. Remove the bolt-stop spring by swinging its rear end down one-quarter turn and lifting it out.

Reassemble all above units in reverse order. In reassembling the bolt-stop, first replace the ejector and bolt-stop, then replace the spring by swinging it in place.

Type 99 takedown: Follow same procedures as described for the Type 38 rifle and action except for the following: to remove magazine floorplate, drive the hinge pin out; to remove the floorplate latch, turn the latch screw out; remove the bolt-stop by removing its screw; the ejector can then be pulled forward out of the bolt-stop housing; the bolt-stop spring is removed by driving it forward out of the housing and the ejector spring is removed along with it. To aid in driving the bolt-stop spring forward, a small screwdriver should be inserted under the rear of the spring so it can be held up while driving it forward until freed from the bolt-stop.

In reassembling the bolt-stop spring, first place the ejector spring under it, then drive both forward until caught. Then insert a screwdriver under the rear end of the bolt-stop spring to hold it up so the spring can be driven fully in place.

The barrels of these rifles are threaded tightly into the receiver (right-hand threads). Do not attempt to remove the barrel unless you have the proper tools to do so.



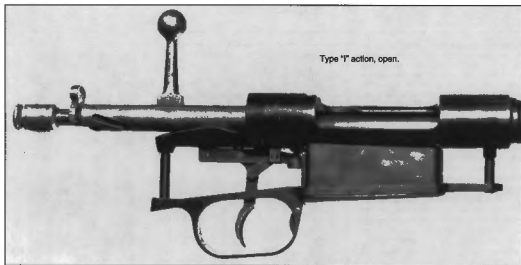
Type "I" 6.5mm Japanese action, these made in Italy for Japan. The receiver, bolt and trigger assembly are a close copy of the Italian Carcano action.

Action Strength

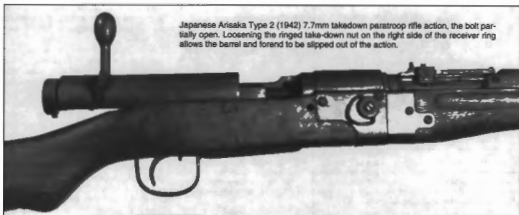
Almost every gun buff interested in military bolt-action rifles, or in just the actions, knows that the 38 and 99 Japanese Arisaka actions are strong. Many articles have been written about the strength and safety of these actions, and many blow-up tests have been conducted since the late 1940s when someone discovered that all Japanese rifles were not junk. P.O. Ackley, in his book *Handbook For Shooters & Reloaders Volume II*, describes tests he conducted on various military bolt actions, and the Japanese actions were still going strong after most of the others had failed. This book is recommended reading for anyone interested in action blow-up tests.

Of all the material I've read about the strength of Arisaka actions, the most astonishing report of the toughness of a Type 38 Japanese action and rifle appeared on page 52

in the May, 1959 issue of *The American Rifleman*. This describes a Type 38 6.5mm Arisaka which was rechambered to accept the 30-06 cartridge. The 6.5mm barrel was NOT rebored, only the chamber was enlarged. The fellow who did the rechambering accomplished it by grinding down the pilot of a 30-06 reamer so it would enter the bore. After rechambering he test fired it. Nothing much happened, so he used the rifle on a hunting trip and killed a deer with it. Because the rifle kicked so hard he took it to a reputable gunsmith who discovered what the owner had done with it and what he was shooting in it. Because the rifle was still intact after firing a number of 30-06 cartridges, the gunsmith sent the rifle to the NRA. The NRA staff then fired some more 30-06 rounds through it, and it seems incredible that neither the barrel nor the action burst, for just imagine firing .308" bullets through a .264" groove diameter barrel! If



Type "I" action, open.



Japanese Arisaka Type 2 (1942) 7.7mm takedown paratroop rifle action, the bolt partially open. Loosening the ringed take-down nut on the right side of the receiver ring allows the barrel and forend to be slipped out of the action.

one were to deliberately plan a torture test or blow-up test on the 6.5mm Japanese rifle one could hardly think of a better scheme, even though it is a little crazy. That this particular rifle did not burst, or even appear to be strained by this abuse, certainly proves that the bolt, receiver and barrel were made of the best heat-treated steels. It also shows that the breeching and locking system is excellent.

About 10 years before the above incident was reported, a friend and I put another Japanese rifle through a torture test with the sole intention of firing it until it blew up or could no longer be fired. For this test we used the worst specimen of this rifle which was ever carted home by a returning GI, a Type 99 rifle in 7.7mm caliber. This particular rifle was such a crude specimen that initially we thought it to be a Japanese training rifle. I rechambered it for the 30-06 cartridge, and purposely cut the chamber fully .010" deeper than normal.

For the test, I loaded a couple of cartridges of each of the following loads in military 30-06 cases:

No. 1. Case full of 3031 powder with a 180-grain jacketed bullet (44 grains of this powder with this bullet is normally a maximum load).

No. 2. Case full of 4198 powder with a 180-grain jacketed bullet (38 grains of this powder with this bullet is considered maximum).

No. 3. Case full of 2400 powder with the 180-grain jacketed bullet (This powder is never recommended for the 30-06 with this bullet, but a charge of 25 grains would be near or above maximum).

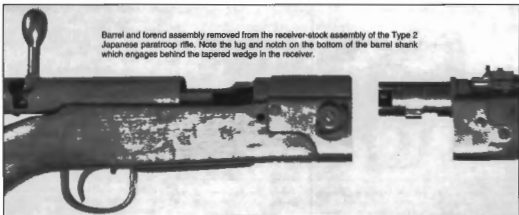
It was dusk when we made the tests. The rifle was tied to an automobile tire and wheel, pointed toward a dirt bank and fired with a long cord tied to the trigger.

We did not expect much to happen on firing both No. 1 cartridges except flattened primers, and that is about all that happened. This was just a good "proof" load. We did,

however, expect something to happen to the rifle when the No. 2 loads were fired, but aside from the rifle bucking in its hitch, the primer pockets expanding, the web splitting, and the case heads spreading to a snug fit in the bolt face recess, nothing unusual happened. We could see a little spurt of flame coming out of the vent hole, but that was about all.

When we fired one cartridge of the No. 3 load, things happened! We noticed streaks of flame coming out all around the action, most of it concentrated around the top and right side of the receiver ring and from the bottom of the action, as the rifle bucked and belled from the shock.

When the dust settled, we rushed to see the damage and were surprised to find the barrel, receiver and bolt intact. The extractor was gone, the bolt-stop was sprung, the follower, follower spring and floorplate were gone, but the bolt and the firing mechanism were still



Barrel and forend assembly removed from the receiver-stock assembly of the Type 2 Japanese paratroop rifle. Note the lug and notch on the bottom of the barrel shank which engages behind the tapered wedge in the receiver.



An action from one of the several different Type 38 military training rifles. This one, with breech cover, is an example of one of the better-made actions, having a regular bolt with full-sized forward locking lugs and regular extractor. However, it has a cast iron receiver, trigger parts and trigger guard. A distinctive feature of these actions is that the tangs are made integral with the receiver and trigger guard.

in place. The bolt could not be opened by hand, and on trying to open it with a stick of wood the bolt handle broke off. On returning to my shop for closer examination, it was found that the right side of the receiver over the full length extractor cut was slightly bulged and that the barrel appeared to have moved forward out of the receiver about one thread. Since the bolt could not be opened we unscrewed the barrel from the receiver, after which the bolt was easily removed. The head of the case seemed to have melted over the bolt face, for it was practically welded in place. After knocking off the case and turning the barrel back into the receiver, the rifle was still in a condition to be fired! In fact, later on another shooter fitted this same barrel to a good 99 action and found that the chamber had not expanded at all. This experience thoroughly convinced us that the Japanese Arisaka actions are extremely strong. A large ring Model 98 Mauser action might have survived this test as well or better, but I suspect that most of the other military bolt-action rifles, as well as some of the commercial bolt-

action centerfire rifles, would not have stood up as well.

Of the Type 38 and 99 actions, the 38 is perhaps the stronger for the following reasons: 1) its left (top) locking lug is only partly slotted for the ejector, leaving it with a solid rear face to contact the locking shoulder in the receiver. The lug is not only stronger but there is less chance of it battering a depression in the locking shoulder as often happens in rifles having a fully slotted left lug; 2) the mill cut for the extractor in the receiver ring is no longer than needed. In the last test described above, it is to be noted that the receiver ring bulged along this cut, which in the Type 99 receiver extends all the way through the ring; 3) the barrel shank threads are coarser and, in my opinion, afford a stronger joint between the barrel and receiver than achieved by the use of finer threads. It is also possible that a better steel and heat-treatment was used in making Type 38 actions, but I'm not sure about this. It is usually assumed that any rifle made during desperate wartime conditions might have inferior steel and/or improper

heat-treatment compared to rifles made under ideal conditions, but nothing of this nature seems to have affected the late Type 99 version we tested.

As for the breeching system used in these rifles, I am not sure it has much effect on the overall strength and safety of the action. This "system" is one in which the bolt head fits closely within a recess in the breech end of the barrel. This breeching system produces the same results as achieved in the M98 Mauser, in which a ring of steel is placed around most of the bolt head.

The weak points in both systems are the wide extractor cut in this ring of steel, and the undercut in the bolt face recess. As far as strength and safety are concerned, I don't believe this breeching method is much superior to the 03 Springfield breech system. There is no question that the 98 Mauser and Arisaka breeching would be far stronger and safer if there was no undercut in the bolt face recess, and if a flush-type narrow extractor were used so the wide extractor slot could be eliminated. When an action blows up it is usually the result of a faulty cartridge—when the head of the cartridge splits open to let large amounts of powder gases escape to the rear. In this event, I fail to see where the 98 Mauser or Arisaka breechings are any better than the 1903 Springfield breeching. In the two previously mentioned Arisaka torture tests, none of the cartridge cases used were faulty. I wonder what would have happened with the 6.5mm Arisaka rifle chambered for the 30-06 cartridge if the head of one of the cartridges had cracked or split open when fired, rather than expanding evenly. I think the results would have been different. A good 03 Springfield action with its funnel breeching will withstand considerable abuse from overloads heavy enough to cause head expansion, but if the head of the case splits with such a load then the situation is different. So that I am not entirely misunderstood, I do prefer the Mauser M98 breeching method over that of the Arisaka, and I prefer either over the Springfield.

Rechambering

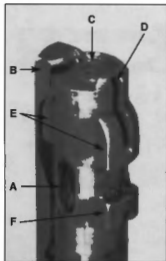
Type 38, 6.5mm caliber: During WWII much erroneous information circulated about "that small caliber Jap rifle." Many believed that they were of ".25 caliber."

Before Norma made the 6.5mm Japanese cartridge commercially available, it was common practice to rechamber the 6.5mm Arisaka rifle or carbine to the 257 Roberts case necked up to hold a 6.5mm bullet.

As long as Norma commercial 6.5 Japanese ammunition and cases are available, there is no longer any practical reason to have the Arisaka 6.5mm rifle rechambered. The Nor-



Another example of the cast iron Arisaka action made for a training rifle. This one has only token bolt locking lugs, a small extractor mortised into the bolt head, and receiver and trigger guard are held in the stock with common wood screws.

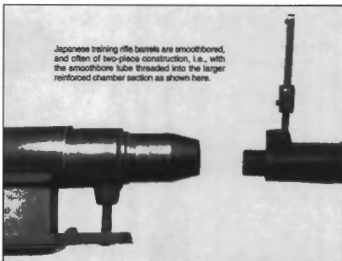


Underside view of the Japanese Type 38 bolt head (6.5mm) showing: (A) gas vent hole, (B) extractor, (C) bolt face recess with undercut, (D) ejector slot, (E) locking lugs and (F) bolt-stop lug. The Type 99 bolt is the same except that the extractor slot is milled entirely through the bolt-stop and locking lugs.

ma 6.5 Japanese case is just as reloadable as any other. If you have one of these Japanese rifles and if you are not sure if it has been rechambered, better have it checked by a competent gunsmith before attempting to fire Norma ammunition in it.

Type 99, 7.7mm caliber: here again we have the same situation. It no longer makes sense to rechamber the 7.7mm Arisaka rifle because Norma also loads this cartridge. Before Norma loaded this cartridge, it was common practice to rechamber 7.7mm Arisaka to 30-06 caliber. Of course, any rechambering is hardly practical since the introduction of Norma 7.7mm Japanese loads. Again a warning—if you are not sure of the chamber in your 7.7 rifle then have it checked by a competent gunsmith.

During the Korean war many Type 99s were rechambered for the 30-06 cartridge and issued to troops of the Republic of Korea. The rechambering was done by U.S. Ordnance units stationed near Tokyo, Japan. I don't know how these rifles were rechambered—whether the barrel was set back or not, or how the magazine was lengthened, because I have been unable to examine one. These rifles can be identified by the marking Cal. 30 U.S. stamped on the left side of the receiver ring.



Japanese training rifle barrels are smoothbored, and often of two-piece construction, i.e., with the smoothbore tube threaded into the larger reinforced chamber section as shown here.

The 6.5mm Japanese Cartridge

Japan adopted this cartridge in 1897. It is a semi-rimmed bottlenecked case primed with a Berdan primer of a size never made available to reloaders. The "6.5mm" represents bore size, or the same as 256-caliber. The standard Japanese military ball loading was a 139-grain spitzer bullet, its muzzle velocity about 2500 fps. Sporting ammunition in this caliber is still manufactured by Norma and is available through many Norma dealers. Norma offers two 6.5 loads—one with a 139-grain semi-pointed, softpoint, boattail bullet; the other using a 156-grain softpoint spitzer bullet. Muzzle velocities for these loads are 2360 and 2070 fps, respectively.

The 7.7mm Japanese Cartridge

Adopted by Japan in 1939, the 7.7mm cartridge has a rimless bottlenecked case. The standard military ball load has a 183-grain pointed bullet with a muzzle velocity of about 2300 fps. Norma has one load for this cartridge—a 180-grain softpoint semi-pointed boattail bullet. The 180-grain load, with a muzzle velocity of 2500 fps, has at 200 yards a remaining energy of 1770 foot pounds.

Summary

For remodeling into a sporting rifle, or using its action to build a rifle, Arisaka rifles are far down on the popularity list of rifles. Until Norma ammunition became available in the Japanese calibers, the Arisaka rifles were not seriously considered for gunsmithing because of the ammunition prob-

lem. Some of their unpopularity is undoubtedly due to the early unfavorable publicity given them during and shortly after WWII. However, I believe the main reason why they have not been used more frequently for remodeling is because the action is not easy to operate.

I have not remodeled many Arisaka rifles, and I can think of only two occasions when I built a complete rifle on this action. I have, however, rechambered many of the 6.5s to the 6.5/257 Roberts. Some of these rifles are still being used by their owners for hunting deer. The amateur gunsmith is cautioned to be on his guard against Japanese training rifles, which are unsuitable for any gunsmithing. These training rifles are discussed at the end of this chapter.

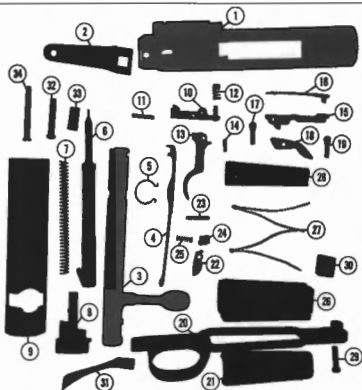
The Arisaka Paratroop Rifle

This chapter would not be complete without illustrations and descriptions of three other types of Japanese military weapons used before and during WWII: the takedown paratroop models, the "T" rifle and the various training rifles.

The first of the takedown paratroop rifles is generally designated as the Type 0 Paratroop rifle. This particular model is quite rare, and I have never examined one closely. Probably developed around 1940, it is based on the Type 99 Arisaka action. Chambered for the 7.7mm Japanese cartridge, it was made so the barrel and forend assembly could be separated from the buttstock and action assembly, with the takedowns effected by an interrupted-thread joint between barrel and receiver. It featured a detachable bolt handle. It has a 25.75" barrel, weighs about 8.75 pounds and

Parts Legend

- 1 Receiver (top view)
- 2 Upper tang
- 3 Bolt
- 4 Extractor
- 5 Extractor collar
- 6 Firing pin
- 7 Mainspring
- 8 Cooking piece/safety
- 9 Breech cover
- 10 Sear
- 11 Sear pin
- 12 Sear spring
- 13 Trigger
- 14 Trigger pin
- 15 Bolt-stop
- 16 Bolt-stop spring
- 17 Bolt-stop screw
- 18 Ejector
- 19 Ejector screw
- 20 Trigger guard
- 21 Floorplate
- 22 Floorplate latch
- 23 Floorplate latch pin
- 24 Floorplate latch plunger
- 25 Floorplate latch plunger spring
- 26 Magazine box
- 27 Follower spring
- 28 Follower
- 29 Front trigger guard screw
- 30 Recoil block
- 31 Lower tang
- 32 Rear trigger guard screw
- 33 Stock bushing
- 34 Tang screw



Type 98 Arisaka

General Specifications Type 98 and 99 Arisaka

(Type 98 uses 8.5mm and Type 99 uses 7.7mm Japanese cartridges)

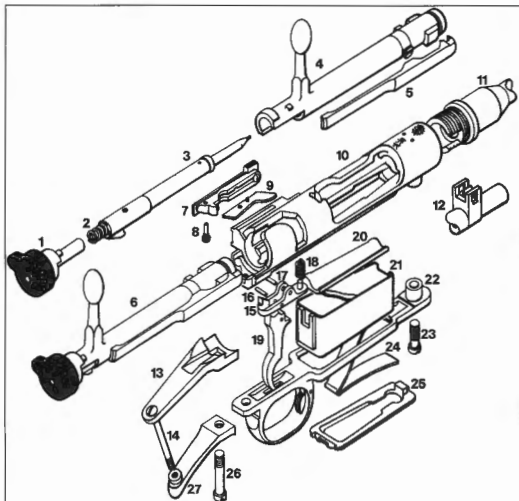
- | | | |
|------------------|-------|--|
| Type | ..... | Turnbolt repeater. |
| Receiver | ..... | One-piece machined steel forging. Clip-charger guide milled in non-slotted bridge. Upper tang is a separate part of receiver. |
| Bolt | ..... | One-piece, with dual-opposed forward locking lugs. Bolt handle base acts as safety lug. |
| Ignition | ..... | Composed of one-piece hollow striker, coil mainspring and safety. Striker cocks on closing the bolt. |
| Magazine | ..... | Staggered-column non-detachable five-shot box magazine. Quick-detachable floorplate on the Type 98, hinged floorplate on the Type 99. |
| Trigger | ..... | Non-adjustable, double-stage military pull. |
| Safety | ..... | Locks both striker and bolt when engaged. (See text) |
| Extractor | ..... | One-piece, non-rotating Mauser type attached to the bolt with a collar. |
| Magazine cut-off | ..... | None provided. |
| Bolt-stop | ..... | Mauser-type bolt-stop attached to left rear of receiver bridge. Stops rearward movement of bolt by contacting auxiliary lug on the bolt. |
| Ejector | ..... | Lever type housed within the bolt-stop. |

is 44.25" overall. In original and very good condition they're a desirable item for any military arms collection.

The second takedown panatroop rifle is the Type 2, developed in 1942 to replace the Type 0. Type 2 rifles also used the 7.7mm cartridge, weigh 9 pounds, and their 25.90" barrel make overall length 44.25". It has a cleaning rod under the barrel and it will accept the regular Japanese bayonet.

The action of the Type 2 is also a modification of the basic 99 action, having the same bolt and magazine parts.

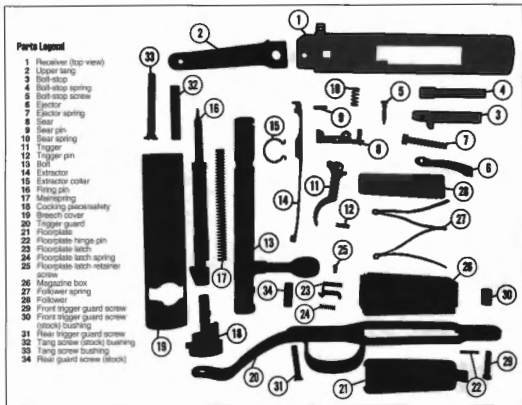
The Type 2 takedown system uses a wedge, through the massive front part of the receiver, to hold the slip-fit barrel in place. The barrel shank is round and smooth except for the solid lug underneath it. The front of the receiver is bored and milled to accept the lugged barrel shank. Under the front part of the receiver, and made integral with it, is a heavy mass of steel through which is milled a rectangular hole for the takedown wedge. It is so positioned that the wedge engages forward of



Parts Legend

- 1 Safety
- 2 Firing Pin Spring
- 3 Firing Pin
- 4 Bolt Body
- 5 Extractor
- 6 Bolt Assembly
- 7 Bolt-stop Assembly
- 8 Bolt-stop and Ejector Screw
- 9 Ejector
- 10 Receiver
- 11 Barrel
- 12 Front Sight
- 13 Upper Tang

- 14 Tang Screw
- 15 Sear
- 16 Trigger Pin
- 17 Sear Pin
- 18 Sear Spring
- 19 Trigger
- 20 Magazine Follower
- 21 Magazine Box
- 22 Trigger Guard
- 23 Front Guard Screw
- 24 Magazine Spring
- 25 Floorplate
- 26 Rear Guard Screw
- 27 Lower Tang



Type 98 Arisaka

the barrel lug. A ringed screw on the wedge threads into the side of the receiver and, with the barrel and wedge in place, this screw is turned to draw the wedge and barrel tightly into the receiver. When turned in the opposite direction, it allows the wedge and barrel to be removed. It is a simple and effective takedown system for a military bolt-action rifle.

There is also a matching shaped block of metal attached to the breech end of the barrel to butt against the receiver when the rifle is assembled. The front tang of the trigger guard is fitted into a milled recess in the bottom of the receiver and held in place with a screw. The extra metal in the receiver and on the barrel adds over a half-pound to the weight of this rifle compared to the regular Type 99 Short Rifle.

The takedown system of the Type 2 appears rugged enough and, with the wedge drawn tight it is probably anchored as securely in the receiver as is the bolt in the receiver.

Dimensional Action Specifications

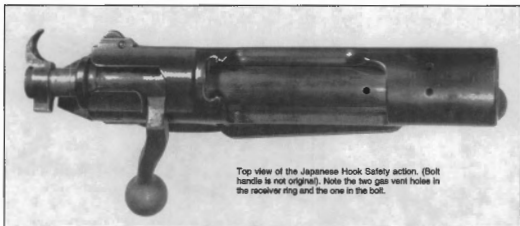
	Type 38 6.5mm	Type 99 7.7mm
Weight	48 oz.	48 oz.
Overall		
(not incl. tang)	4.730"	4.730"
Receiver ring dia.	1.335"	1.345"
Bolt body dia.	.700"	.703"
Bolt travel	4.415"	4.425"
Stroke travel	5.600"	5.600"
Guard screw		
spacing	6.930"	6.930"
Magazine well opening:		
Length	3.130"	3.210"
Width	.800"	.640"
Bolt face recess:		
Dia.	.485"	.485"
Depth	.065"	.060"

Because Type 2 rifles are not very common they would be worth much more as a collector's arm if left "as issued."

Type I Japanese Rifles

One of the unusual Japanese military shoulder arms is the Type I rifle. Very little is known about its history except that it is a hybrid, made in Italy for Japan. It has features of the Italian M91 Carcano rifle and the Type 38 Arisaka. Chambered for the 6.5mm Japanese cartridge, they were made by the Pietro Beretta firm in Gardone, Italy, perhaps even by other Italian firms. I don't know when or how many were made.

The Type I rifle has a 30.5" barrel, weighs about 9 pounds and is 49.75" overall. The barrel and sights are similar to those on the regular 38 Arisaka rifle. A half-length wooden handguard covers part of the barrel. It has a cleaning rod in the forend under the barrel and the rifle accepts the regular Arisaka bayonet. The barrel bands, and the method by which they are held in place with spring clips, the grasping grooves in the forend and the sling



Top view of the Japanese Hook Safety action. (Bolt handle is not original). Note the two gas vent holes in the receiver ring and the one in the bolt.

swivels, are patterned after the Type 38 rifle stock. No tangs are employed.

The receiver, bolt and trigger mechanism are near copies of the Italian M91 Carcano action, and the Mauser-type staggered-column magazine is a close copy of that of the Type 38 action. The trigger guard bow is large like that on the Carcano action. The bolt, firing mechanism, trigger mechanism, safety, extractor, bolt-stop and ejector are practically identical to the same parts in the M91 Carcano action, though they are not interchangeable. The receiver differs from the Carcano in that its magazine well is wider, with cartridge guide lips milled in to handle cartridges from the staggered-column magazine. The front of the slotted bridge is grooved to accept a stripper clip. The trigger guard, magazine box, floorplate, floorplate latch, follower and follower spring are nearly identical to these parts in the Type 38 action. Type I action specs follow:

Weight	42 oz.
Magazine well opening:	
Length	3.125"
Width, front .....	.550"
Width, rear .....	.540"

Receiver length, receiver ring diameter, bolt diameter, bolt travel and striker travel are about the same as in the M91 Carcano action. See the chapter on the M91 Carcano for more details.

Of the thousands of military rifles I've seen, only two were Type I rifles, so I doubt if many are around. At any rate, if anyone wants to remodel or convert this rifle that's his business, but I think it would be better to sell or trade it to a military arms collector and use an M98 Mauser, which is plentiful.

Japanese Training Rifles

The Type 38 Training Rifle is one of several variations of training or drill rifles that

Japanese made. Outwardly, none of them appear to be much different from the regular Type 38, but outward appearances are deceiving. No discussion of Japanese military rifles would be complete without mention of them. The reader should be warned, however, that these rifles are *positively dangerous if fired with live ammunition*.

Although I've only been able to examine four of these rifles in the past, all were essentially alike in appearance except for bolt and receiver details. There probably are others that are different from the ones I have seen, but I believe they can all be classed in the same category. Outwardly, these training rifles are identical, or nearly so, to the regular Type 38 infantry rifle. They are approximately the same weight, length and size, and are stocked in the same manner and usually have sights similar to the Type 38. A bayonet can be attached to them, and often they're complete with a cleaning rod under the barrel. All have smoothbored barrels and are chambered for the 6.5mm Japanese blank or training cartridge. The barrel may be a worn out one salvaged from a regular Type 38 rifle and then bored out smooth, or merely a piece of tubing screwed into the heavier (reinforced) breech end of the barrel.

Most 6.5mm training rifles have a cast or forged iron receiver, the upper tang integral with it. Often the outside finish of these receivers is very rough. Some have a receiver made of steel tubing with the rear tang welded on. Practically all have the receiver grooved for the sliding breech cover, and a couple of them I examined had these covers. All have a rough cast trigger guard with an integral lower tang. Instead of a rear guard screw, these actions usually employed a tang screw connecting the two tangs. On one rifle I exam-

ined, only the barrel bands held the barrel and action in the stock and two wood screws held the trigger guard and magazine in place.

I have seen three different types of bolts and receivers in these training rifles. One had a standard pattern bolt with dual-opposed locking lugs which engaged in the receiver ring, and was fitted with the standard long, non-rotating extractor. Another had a bolt with thin dual-opposed locking lugs which engaged in the receiver ring, but with a thin spring extractor mortised in the bolt body and extending through a slot through the right locking lug. The last one had no forward locking lugs, the extractor fitted in the bolt head, and a rib on the bolt which engaged forward of the receiver bridge to hold the action closed. All of these bolts appeared to be castings.

These training rifles can usually be identified by their smooth bores, but the surest method is to remove the barrel and action from the stock, and if the tang is integral with the receiver, or welded in place, then you know for certain that it is a training rifle. Regardless of the type of bolt it has, these rifles should never be fired with bulletted ammunition or the action used for building a rifle.

Markings

Regular issue Japanese military bolt-action rifles in calibers 6.5 and 7.7mm have the Japanese imperial seal stamped on the top forward part of the receiver. This seal is round, up to about 7/16" in diameter, and resembles a sunflower or daisy blossom with sixteen petals. It is often referred to as the "rising sun" or "chrysanthemum" marking. On many Japanese rifles this seal has been partly or entirely ground away, indicating these partic-



The Japanese Hook Safety action. Note: The bolt handle on this action is not original. The original bolt handle has a straight shank, oval-shaped grasping knob and it projects straight out to the right when the action is closed, straight up when the action is open.

Japanese Hook Safety Action

Dimensional Action Specifications

Action weight	2.8 lb.
Action (receiver) length (not including tang)	.8"
Receiver diameter	1.350"
Receiver ring length	1 13/16"
Bolt diameter	.708"
Bolt travel	.45"
Striker travel	.500"
Guard screw spacing	.75"
Loading port length	2.875"

General Specifications

Type	Turnbolt repeater operated by bolt handle.
Receiver	One-piece steel construction, mostly round with no prominent recoil lug.
Bolt	Two-piece; rotating bolt body with dual-opposed forward locking lugs and separate non-rotating bolt head. Root of bolt handle serves as an auxiliary locking lug.
Ignition	One-piece striker (firing pin), coil mainspring, cocks on closing the bolt.
Magazine	Staggered-column, non-detachable magazine. Detachable floorplate.
Trigger	Double-stage, non-adjustable.
Safety	Rotating finger hook safety locks striker.
Extractor	One-piece spring steel hook mounted in bolt head.
Bolt-stop	Pivotal type mounted in left receiver wall. Stops rearward travel of bolt and activates the ejector at the same time.
Ejector	Sliding ejector dovetailed into the bolt head.

ular rifles were surrendered. Rifles with the seal untouched were generally captured arms.

Below the imperial seal are stamped the Japanese characters indicating the type and year designation of the rifle. These markings are illustrated nearby. The imperial seal is not found on Japanese training rifles, but a few are marked with Japanese characters to indicate they are for use with blank cartridges only. Sometimes there is another marking on the receiver ring of these training rifles, probably the mark of the arsenal which made them. The Type 99 (late version) rifle carries the imperial seal, but has no type or year markings.

On all 6.5 and 7.7 Japanese bolt-action rifles I've seen, the serial number is stamped on the left side of the receiver, below the groove for the sliding breech cover. I have no information on the serial numbering pro-

cedures followed in Japan, so the serial number in itself means little. The Type 38 action pictured in this chapter has a serial number well over 5,000,000, which may be some indication as to the number of these rifles produced.

One or more various small markings often precede or follow the serial number marking. These marks may be arsenal identification marks and/or arsenal proof marks. On Type 38 actions part of the serial number is usually stamped on the underside of the bolt handle base, and on some of the other parts as well, such as the trigger and trigger guard.

I will end this chapter with a description of perhaps the rarest and most unusual Japanese military rifle action of all.

I have never seen or examined a Japanese military rifle which, because of its hook-like safety, is usually called the Hook Safety Japanese rifle. I have seldom read anything about it either. Therefore I can write only about the action, an action which I obtained on loan from a kind reader, an action which originally had the bolt handle replaced. The most I have ever read about it is in the book *Shots Fired In Anger* in which the author, Bradford Aniger, describes this rifle he obtained while in the service in the South Pacific during WWII. He identifies it as the "Thirty Year" Japanese Carbine. It evidently was a forerunner of the Type 38.

The receiver of the Japanese Hook Safety action is of one-piece construction probably



Left side of the Japanese Hook Safety action.

being machined from a forging. It is basically round except for a flat area around the magazine box and on both sides of the front guard screw stud. There is no recoil lug worth mentioning, although the stock may have been fitted with a separate steel lug into which the guard screw stud fitted. The receiver tang is several inches long, the loading port opening about 2 1/4", with the receiver proper minus tang 8 inches long. The top of the bridge is nicely contoured and its forward edge has a cartridge clip slot similar to that of the Model 98 Mauser military action. A bolt-stop similar to that used on the German Model 88 Commission rifle and on the Mannlicher/Schoenauer action is fitted in the rear left side of the bridge, and the right side wall notched deeply for the root of the bolt handle. This notch is similar to that found on the Japanese Models 99 or 38 Arisaka actions. The rear end of the tang is squared off.

The inside of the receiver is machined to accept the two-piece bolt with its dual-opposed forward locking lugs, and this means that raceways are cut to allow passage of the locking lugs and shoulders machined inside the receiver ring for the lugs to engage with. Both locking lugs are solid. A separate quick-detachable bolt head with a flat face is fitted into the front of the bolt body and held in place by a small lug on the bolt head engaging in a matching slot inside the bolt body. This bolt head does not rotate with the bolt body. Fitted in a groove in the right side of the bolt head, and between it and the bolt body, is the simple one-piece spring steel

extractor, while the sliding ejector is fitted on the left side in a dovetail. The arrangement of the bolt head, extractor and ejector is almost identical to the system used in the German M-88 Commission and early Mannlicher/Schoenauer actions. And as on these rifles, the breech of the barrel is recessed and slotted on both sides to accept the front end of the bolt head, extractor and ejector. There are no gas vent holes in the bolt body or head, but there are two small angled vent holes in the top of the receiver ring in junction with the breech of the barrel.

The bolt handle (Note: the original bolt handle on this action has been replaced with a modern-styled one) is an integral part of the bolt and its root serves as the safety locking lug which fits into a deep notch machined in the right receiver bridge wall. A flange encircles the rear end of the bolt and serves to seal off the locking lug raceways. Just ahead of this flange the bolt is machined to provide a preliminary cocking cam for the firing mechanism.

While the front end of the bolt with its separate bolt head arrangement is a familiar one, not so the arrangement of the parts on the rear of the bolt. To say the least, it is a very odd arrangement of parts that make up the safety, cocking piece and other parts to cock the striker. I was puzzled by it and I had the bolt on my desk for ten days and still could not discover how to disassemble it to find out just how it worked. It was not until I read about this action in Bradford Angier's book did I get the striker mechanism disassembled. I won-

dered just what the designer of it had in mind because it was surely one masterpiece of incompetency.

The bolt is drilled and bored out from the front to within about 1.5" from the rear end, leaving a collar at that point through which the rear end of the striker projects. The one-piece striker also has a collar near its tip and the coil mainspring is compressed between these two collars.

Thus far it is simple enough, but wait, it gets complicated. The rear end of the bolt is also machined out for the collar and a safety/half-cocking cam opening made into it while still leaving a collar.

What follows is reassembly of a completely stripped bolt, in proper order. Taking the striker with mainspring slipped over it, position it into the bolt. Next comes the part which I will call the striker seat, a small part which has a triangular sear projecting from it and which has a hole through its center partly threaded. This striker seat is then positioned inside the rear end of the bolt so that the rear end of the striker can pass through it.

Next comes the hook safety, a part that can also be called a cocking piece because the striker can be cocked with it, and it is slipped into the rear of the bolt, with the hook opposite the bolt handle. This part has twin projections on its forward end that engage in matching notches in the rear threaded end of the striker seat, the purpose to be explained later.

Next comes the striker head. It is a split two-piece part threaded at its front to slip into

PART I: Military Rifles & Actions

the safety and threaded into the striker sear. The rear end of the striker has two grooves turned into it, and the inside of the two-piece striker head has two matching collars so that the parted halves can fit over the rear of the striker and engage with it with the two halves held together by the safety and the threaded end. Now, to assemble it, the striker must be pushed back into the bolt to compress the mainspring fully. The two halves of the striker head are slipped onto the end of the protruding striker, and the striker is allowed to go forward again, drawing the striker head partly into the safety. To finish the job, the striker head is then turned clockwise until it is fully threaded into the striker sear, which will require about four turns. There is a small plunger in the knurled end in one of the striker head halves, and it must be depressed on the last two turns in order to slip past the safety. To disassemble this creation, remove the bolt head first, and with a metal rod which will slip into the bolt body held in a vise (Note: the cleaning rod in this carbine has a head specifically made to serve as this tool), and with the bolt in one hand and the striker tip on the end of the rod, press down on the bolt to push the striker in as far as it can go. The rear end of the striker will then project far enough out of the bolt and safety to allow the two halves of the striker head to be slipped in place; that is, if your fingers of the other hand are adept at handling two parts. When in place, relax the pressure on the bolt and the striker head will move into the safety and the threaded end will contact the striker sear. Now turn the striker head clockwise until tight. The striker head is fitted with a small spring-backed plunger, and it has to be depressed to slip under the safety on the last two turns. Conversely, this plunger has to be depressed on disassembly. The procedure for complete disassembly is to turn the striker head counter-clockwise until the threads are out of engagement, and using a rod as mentioned before, push the striker into the bolt as far as it will go, remove the split striker head, and presto, everything comes apart.

How does the bolt and striker arrangement function and how is it operated? To replace the bolt in the receiver, the safety (the safety-lever is the larger hook) must be to the left—opposite the bolt handle. Cocking occurs on closing the bolt, and on turning the bolt handle down the action is locked and cocked. Pulling the trigger will release the striker and fire the rifle. If the rifle is not to be fired and put on safe instead, then pull back on the safety hook, swing the hook upright and ease it forward or release it to fall forward. Either way the rifle won't fire because the twin projections on the end of the safety no longer align with the notches of the striker sear, thus halting the

striker well before the striker tip (firing pin tip) protrudes from the bolt face. With the safety in this position the hook obscures the sight line and locks the bolt closed. To fire the rifle, the striker must be cocked again and to do this it has to be pulled back via the safety and the safety swung to the left.

I imagine this is the reason why this rifle is called the Hook Safety rifle. Anyway, before the safety hook can be swung to the left, it is being held back far enough so that when it is swung all the way the action is cocked and ready to fire. Closing the action, putting it on safe and cocking it again cannot be quickly or conveniently done. One reason the safety is not conveniently operated is due to the puny finger hook.

Disassembly in the field of the firing mechanism surely posed a greater threat of losing parts at both ends of the bolt.

This bolt has not a single commendable feature, or at least I have not found it.

The trigger mechanism is a simple, but rather crude one comprised of the trigger, sear, sear spring and two pins on which these two main parts pivot and are held in place. On the front end of the sear, and extending upward through a hole in the receiver, there is a pin. There is a matching groove cut into the bolt body so that unless the bolt is fully closed the trigger cannot be pulled to fire the rifle. This same arrangement is used on the later Arisaka rifles as well as in the P-14 and M-17 Enfield actions.

The trigger guard and magazine plate is a one-piece machined steel unit with a hole at each end to accept the two guard screws which thread into the receiver to hold the action in the stock. The magazine floorplate is detachable and held in place by a spring-loaded catch positioned in the front of the guard bow. Fitted between the trigger guard and receiver is a sheet metal magazine box. The magazine follower is also a sheet metal stamping and it is provided tension by a zig-zag wire spring fitted to both the floorplate and the follower. This is the first high-powered action I have ever seen using spring wire for a follower spring.

All in all, this action is well made but poorly designed. In particular, both ends of the bolt. For example, take the bolt head. Field-stripping this bolt while on anything other than a bare floor or bare ground, the bolt head assembly could easily be lost, and if not the entire unit, the extractor and/or the ejector could be more easily lost. I have come across quite a few German M88 Commission rifles with the bolt head missing or the extractor gone, probably due to having been lost. This surely is a deplorable arrangement for a military rifle.

The rear end of the bolt is just about as bad. This action could have been made to fully



A close-up detail of the hook safety.

cock on the up-swing of the bolt handle, but instead it was made to cock on the closing of the bolt. This is not altogether bad, but I see no rhyme or reason in the design of the hook safety. To begin, the hook is too small. Rather than being designed as a safety, it appears to me that the hook was put there in order for the soldier to recock the striker in case of a misfire, but with the hook is too small to do this with ease. And as for a safety, after the action is cocked, this hook can only be swung down requiring that it be pulled back a slight amount first. When swung down, the striker is then put on SAFE. However, there is no positive halting point to stop the swing of the hook until its end touches the stock and then it is not easily swung back again. It is crude to say the least.

And cruder still is the entire cocking mechanism. Not having any instructions on how to disassemble the bolt and firing mechanism it took me hours to figure it all out. Anyway it was no wonder why this Hook Safety rifle with its rather complicated action was replaced by the Type 38 rifle.

Conclusion

A great many Japanese rifles were brought into the United States by G.I.s after WWII, and many more were imported and sold by dealers in military surplus arms, so the total number in the U.S. must be great. Many of them will remain souvenirs and many of the better specimens and the rarer ones are in collections or will be obtained for this purpose.



Krag-Jorgensens: U.S., Danish and Norwegian

THE CALIBER 45-70 single shot "trap-door" Springfield rifles and carbines had served the United States Army quite well since 1873, when the model was adopted. By the late 1880s, however, military men were discontented with it, and it was felt that a smokeless-powder cartridge and a repeating rifle to handle it were needed. Some of the other world powers had already adopted these changes, including France (8mm in 1886), Germany (8mm in 1888), England (303 in 1888) and Belgium (7.65 mm in 1889). To work toward this change, boards of inquiry were appointed to look into the selection of a suitable new rifle and cartridge, to determine by test the best rifle to adopt and manufacture. In 1890, some 53 rifles were submitted (some were nearly alike or minor variations of the same action) for the tests.

Among the rifles submitted were the Lee Magazine system, Mauser (Belgian M1889), Swiss Rubin, French Berthier, German Commission M1888, Mannlicher, Savage and Krag-Jorgensen. Incidentally, the Savage was an early version of the M59, a lever action with rotary-spool magazine. As a result of these trials, the Krag-Jorgensen (with some modifications to be made) was adopted in 1892, with a royalty to the inventors.

This rifle was a joint invention of two Norwegians: Capt. Ole Herman Johannes Krag and Erik Jorgensen. Denmark had already adopted their design in 1889, but Norway waited to do so until 1894.

Adopted with the new rifle was a new 30-caliber cartridge. Using a rimmed, bottlenecked case, it was the first U.S. military cartridge loaded with smokeless powder—officially the "30 Army" or "30 Government" or, more popularly, the "30-40 Krag." More on the cartridge later.

Although officially adopted in 1892, it was not until 1894 that Springfield Armory (Springfield, Mass.) was sufficiently tooling up to begin making the Krag. Meanwhile, and for several years after 1892, the old 45-70 Springfield continued in service use. In fact, not enough Krags had been made by 1898 to arm all of our soldiers who fought in Cuba during the Spanish-American War, and many of the old 73s were used in that short but costly conflict.

The Krag Rifles and Carbines

All U.S. Krag rifles and carbines are marked on the left side of the receiver roughly as follows:

U.S.
MODEL (year) SPRINGFIELD
ARMORY (serial number)

Only rifles were made at first, these the M1892. On this rifle, the word **MODEL** was omitted from the receiver marking and they were stamped **1894**, indicating only the year they were made.* The M1892 (marked **1894**) has a 30" barrel with a flat muzzle, a ramrod under the barrel, a square-toed stock, and no tripod in the buttpate. The first deliveries were made in the fall of 1894.

A very few test M1892 carbines were also made. These had a 22" barrel, were stocked nearly to the muzzle and had a ramrod. All military U.S. Krags were made without a pistol grip.

Some changes were made, and a Model 1896 rifle and carbine were brought out—and so marked—in that year. The muzzle was crowned, the ramrod was eliminated, and a 3-piece sectional cleaning rod, to be stored in a hole in the buttstock through a trap in the steel buttpate, was furnished. The buttpate toe was rounded also.

The M1892 Krag rifles already in use in the field were returned to the armory and converted to the M1896 pattern. To identify these converted models, look for M1896 features on those pieces bearing the 1894 date.

The first real carbine production began in 1896. The M1896 carbine had a half-length forend with a barrel band to hold forend, hand guard and barrel together. The barrel band lies against the front end of the rear sight. These

carbines had no ramrod or sling swivels, but were fitted with a so-called saddle ring on the left side of the stock.

The biggest changes to both Krags came with the M1898 rifles and carbines. The two most noticeable changes were the reversal of the magazine cutoff so that it was in the ON position when swung down, by changing its spring, and eliminating the lip under the bolt-handle notch. Far more M1898 rifles were made than any others, nearly 263,000 of them. Only 5000 M1898 carbines were produced.

The M1899 Krag carbine had a forend about 2" longer than the M1896 type and used the same length handguard as the rifle. This placed the barrel band about 2" ahead of the rear sight. The saddle ring was omitted, and some were made with a knurled, but unfired, cocking piece—commonly called a "headless" type.

A number of very minor changes were made in the Krag from 1894 on, but they are not important enough to be mentioned here. Various rear sights were also used, and these, as well as other changes, are covered thoroughly in other books.

Some unusual and now rare versions of the Krag were made. The Cadet rifle was similar to the regular M1896, but it lacked sling swivels and had a ramrod.

A few 22 rimfire Gallery Practice rifles were made at Springfield Armory in 1906. They were single shot rifles based on the M98 action, the barrels offset at the breech and made with an auxiliary extractor. These 22 barrels were made under the watchful eye of famed barrelnmaker Harry Pope. Some, at least, carry his name stamp.

After the 1903 Springfield rifles were in production, most of the Krag rifles and carbines were sold to NRA members through the DCM

*The unending search for U.S. Krags marked Model 1892 has failed, so far, to turn up even one.

(Above) U.S. Krag-Jorgensen Model 1898 rifle.



U.S. Krag-Jorgensen Model 98 action.

at unbelievably low prices.* The carbines were far more desirable than the rifles, so many of the M98 Krag rifles were converted to the carbine style at the Bericini Arsenal. These were like the regular M99 carbine, but came with sling swivels and 03 Springfield front sights.

The Krag Action

As already mentioned, those changes made in the Krag action were minor, relatively unimportant. Because the M98 Krag was made in the largest numbers and is the model most likely to be seen, I'll describe it.

The Krag has a very smooth-working turn-bolt action with a unique non-detachable, but quick-loadable, horizontal magazine. It is probably one of the smoothest bolt actions ever made in the United States, but it does have its faults, as we shall see.

The receiver was precisely machined from a one-piece steel forging. The barrel is threaded (square-type threads) into the front of the receiver. The barrel, made without a shoulder, has a flat breech end which butts against a collar machined inside the receiver ring. The round receiver ring has no recoil shoulder. The left wall of the receiver continues straight back from the ring, and since it is not milled out for a locking lug raceway, it is very thick. The receiver bridge is slotted for the extractor and top part of the bolt sleeve, but naturally has no cuts for a stripper clip, since the magazine can only be loaded from the side. The receiver ends in a tang, rounded on top.

*Sometime in the mid-1930s, I learned that a "special" Krag was available from the Rock Island (Illinois) Arsenal. These were brand-new rifles, the barrels 24" long (not 22", as had been the standard DCM carbines) fitted with a carbine stock, also new, and an 03 front sight. The price was \$6.50, plus the usual packaging and shipping charges, compared to the \$15.50 the 22" barreled carbines had cost some years earlier.

I obtained two of these, kept them a while and traded them off. I wonder where they are now?

The one-piece smoothly machined and polished bolt has a single forward locking lug which engages a matching mortise milled in the bottom front of the receiver, just to the rear of the internal collar against which the barrel abuts. The rear surface of this mortise is partly inclined so that the locking lug can gain a purchase on it when closing the bolt, to force it forward the last .150" against the tension of the mainspring and/or a hard-to-chamber cartridge. When the bolt is locked, the locking lug is at the bottom, but on the 1/4-turn required to open the bolt, the lug is to the right.

On the center of the bolt body, 90° above the locking lug, there is a guide rib about 2.70" long. As the bolt is opened and closed, this guide rib, and attached long extractor, slides through the slot in the receiver bridge, helping to prevent any binding of the bolt movement. More importantly, however, the guide rib provides an auxiliary safety locking lug for the bolt; it engages forward of—but does not contact by a few thousandths of an inch—the front edge of the bridge.

The bolt handle, integral with the bolt, is on the extreme rear of the bolt body. Its base is square; its shank is straight, round, heavy and tapered; and it ends in a round grasping ball. It is positioned at a very low angle when the bolt is closed and is still sufficiently low when fully raised to clear the eyepiece of a low mounted scope. The receiver tang is deeply notched to receive the square base of the bolt handle, and although there is normally considerable space between the rear of the handle base and the notch, this provides another safety lug to hold the bolt in the receiver should the single forward locking lug and the guide rib fail. More on the Krag locking system later on.

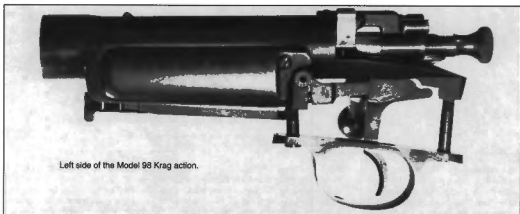
The right rear of the receiver bridge is slightly angled. Primary extraction power is achieved on raising the bolt handle when its base slides along this surface.

The face of the bolt is recessed the depth of the 30-40 cartridge rim. The rim around this recess is quite thin, but when the bolt is closed, the head of the bolt fits snugly within the receiver ring collar. Thus the cartridge head and rim are fully enclosed and supported.

The firing mechanism is held in the bolt by a projection on the bolt sleeve which is milled to form a hook engaging over a raised semi-circular collar on the rear end of the bolt. This projection houses the rotary wing safety, and in a slot in its front part, the long extractor is held with a rivet driven in from the underside.

The striker rod, with its peened-on cocking piece, extends through the bolt sleeve; the coil mainspring is compressed over the striker rod against the front of the bolt sleeve and the separate firing pin. The firing pin fits over a groove on the front of the striker rod. When the striker is forward, a cocking cam on the bottom of the cocking piece extends forward into a deep notch cut into the rear of the bolt; on raising the bolt handle, the cocking piece is forced back, cocking the action.

The safety consists of a wing-type lever, to which a round stem is permanently pressed in place, and a small spring and plunger assembled in the wing before the stem and wing are joined. The stem of the safety extends through a hole in the upper part of the bolt sleeve with the plunger engaging a shallow groove cut into the bolt sleeve. Swung to the far left, the safety is in the OFF or FIRE position. When the striker is cocked, swinging the safety upright or to the far right position locks both striker and bolt. There is a wide notch cut into the top of the cocking piece to allow the safety to be engaged (swung up or to the right) when the striker is forward, locking the bolt closed. Whether cocked or uncocked, the bolt is locked closed when the safety is up, or to the right, by the flattened end of the safety stem engaging a notch in the rear of the bolt.



Left side of the Model 98 Krag action.

The extractor serves several functions besides its primary job of extracting fired cases or cartridges. The extractor, about 5" long, is made of a rectangular bar of spring-tempered steel and is attached to the bolt sleeve by a rivet. A narrow hook on the front of the extractor extends over the forward end of the bolt and through a matching notch in the receiver ring collar when the bolt is closed. The breech end of the barrel also has a shallow inclined notch for the entrance of the extractor hook, so that it can engage the case rim when the bolt is closed. Although the long extractor itself is spring-tempered and made to lie with tension against the bolt, an additional small extractor spring is fitted into the underside left-front end of the extractor. It slides under a small shelf in the receiver and provides extra downward tension to the extractor for positive initial extraction.

The extractor also functions as a means of holding the bolt in the receiver and in removing the bolt from the receiver. When the bolt is fully opened, it can be removed from the receiver by merely raising up the extractor hook so the bolt handle can be turned open further, and then the bolt can be pulled out of the receiver. The long stem of the extractor, which fits snugly in the receiver bridge slot, also prevents the bolt binding in the receiver when the action is operated and adds to the smoothness of operation. There is also a small pin projecting from the top right-front of the extractor, and when the bolt is fully opened, it engages a shallow notch in the receiver bridge. This small pin has enough tension to hold the bolt open when the muzzle is pointed down. This is helpful to the shooter using the rifle as a single shot, as he can drop a cartridge directly into the chamber. This feature, retained in the 1903 Springfield by different means, was called the "bolt-stop."

Actually, there is no separate bolt-stop in the

Krag action, that is, a part or parts to halt the rearward travel of the bolt. The Krag bolt is stopped in its rearward travel by the locking lug contacting the receiver bridge. This is a very simple and positive arrangement, but few actions other than the Krag can use this feature.

The ejector, a small lever positioned in a groove in the rear bottom of the receiver, pivots on a small pin. One end of the ejector is always above the inside bottom line, and there is a long L-shaped groove cut into the bottom of the bolt to allow passage over the protruding rear part of the ejector. The long groove in the bolt ends just short of the front end of the bolt, and when the bolt is fully opened, the ungrooved end of the bolt causes the ejector to tip up. This, in turn, causes the cartridge case to tip up and be flipped upward out of the action.

The trigger assembly is composed of the trigger, sear, sear spring and trigger pin. The sear, with a cylindrical pivot surface on its front end, fits into a matching hole in the receiver. A projection on the rear of the sear passes through a hole into the receiver and engages the sear projection on the cocking piece when the action is operated.

The trigger is the standard double-stage military pull type. The first stage disengages the sear about halfway off the cocking piece; the heavier second-stage pull moves it entirely off to release the striker. On being pulled, the trigger not only moves back, but also swings downward, not too unlike the trigger on the military Mannlicher-Schoenauer action. This is why the curved part of the trigger appears so short; by the time the trigger is pulled back far enough to release the striker, the bottom end nearly touches the guard bow.

The trigger guard bow is a separate part milled from a steel forging. Two guard screws, passing through holes in the ends of the guard, thread into the bottom of the receiver at the rear of the magazine and tang. These two

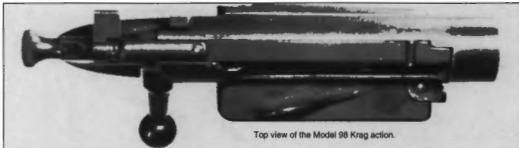
screws are more than ample to hold the rear part of the action in the stock, but some additional fastening is needed (a barrel band is employed on the military Krags) to hold the barrel and front of the action in the stock.

The Magazine

The Krag magazine is novel, clever and somewhat complicated. The receiver forging was made deep enough so a hole could be milled through it to form a horizontal magazine well. The milling is complicated, the front and rear ends of the well slanting forward from right to left to compensate for over-lapping of the cartridge rims. Another long opening is milled into the left receiver wall to provide an opening to allow cartridges to enter the receiver.

A concaved cover, mortised and screwed in place, is positioned over the openings on the left side of the receiver; this forms a rounded curve for passage of the cartridges from the magazine well proper into the receiver-well opening. The rear part of this opening is only wide enough to allow part of the cartridge rim to project from it so it can be picked up by the bolt. About halfway forward, the opening widens so the rim can slip out into the receiver while being pushed into the chamber.

The rest of the magazine is fully as complicated. The follower arm consists of the arm itself, plus a movable follower plate pivoted on a pin at the rear of the arm. The front end of the follower arm has a round integral hinge pin which fits into a matching hole milled into the right front side of the receiver. The follower is powered by a flat spring which lies in a groove in the bottom edge of the magazine well, with its front end contacting a small lug on the follower arm hinge pin. Finally, to cover the right opening, and to allow loading the magazine through it, a box-like gate is hinged longitudinally to the bottom edge of the magazine well



Top view of the Model 98 Krag action.

on a long hinge pin. The gate is powered by the follower spring, providing a lot of tension to the gate to keep it either closed or open. A sturdy hook in the forward bottom edge of the gate engages a matching cut in the follower arm so that, when the gate is swung open, the hook engages the follower arm and pulls it within the hollow gate, so cartridges can be dropped into the open magazine.

With cartridges in the magazine and the gate closed, the follower arm is released and the cartridges are pushed to the left and up around the curve into the magazine receiver-well opening. An upright projection on top of the gate serves as a thumb-piece so the magazine can be quickly and easily opened. The magazine can be loaded, with the bolt open or closed, and cartridges can be added to a partially filled magazine. No skill or precautions needed be exercised when loading; as long as the bullet is pointed forward, the cartridges can be just dropped into the open magazine.

The magazine cutoff is a lever on the rear left of the receiver. The round stem of the cutoff fits into a hole drilled lengthwise into the side of the receiver. The end of the hole exits in the top of the magazine-well opening. The end of this stem is flattened on one side, and when the cutoff is in the upright or ON position, the flattened end of the stem is level with the surrounding metal and does not interfere with cartridges moving through the magazine. When swung down, however, in the OFF position, the round end of the cutoff stem projects into the magazine well, preventing cartridge movement in the magazine and holding the topmost cartridge head within the magazine well so the bolt cannot pick it up when it is closed. The rifle can then be used and loaded as a single shot while keeping a reserve of cartridges in the magazine. The cutoff is tensioned to keep it in place in either the up or down positions.

Takedown and Assembly

First make sure the rifle is unloaded. To remove the bolt, open it fully and, while lifting up the front end of the extractor, turn or raise the bolt handle further until the extractor swings to the right, then pull the bolt out. To

remove the firing mechanism, grasp the bolt handle with one hand and, with the other hand, pull back on the cocking piece and rotate it counterclockwise until it is released from the bolt. With a firm grasp on the rear of the firing mechanism, and with the other hand grasping the firing pin, tilt the firing pin up or down. The firing pin, mainspring and striker rod can then be removed from the bolt sleeves. Place the safety in the upright position and, with the rear of the bolt sleeve resting on an edge of the work-bench, give a sharp rap to the safety with a hammer handle and it will snap out. The safety plunger and spring cannot be removed. Remove the extractor by driving out the holding rivet from top to bottom with a drift pin. The auxiliary extractor spring can be driven out to the left, and the bolt-stop pin can be driven out. These two parts, however, should remain in place unless it is absolutely necessary to remove them. Reassemble in reverse order.

To remove the barrel and action from the stock, first remove the barrel band (or bands), then remove the two trigger-guard screws; lift barrel, action and trigger guard from the stock.

To remove the trigger and sear assembly, pull the rear of the sear down as far as it will go; then tap the assembly to the left. Drive out the trigger pin from left to right to remove the trigger from the sear.

The magazine cutoff is removed by inserting a small screwdriver blade under the cutoff plunger, depressing the plunger as far as it will go and then pulling out the cutoff. The cutoff plunger is peened in place. It and the spring should not be removed from the cutoff unless necessary; as it would be if this part is to be blued in hot-dip bluing salts. If it is necessary, the plunger can be pulled and twisted out by gripping it with a pair of pliers.

To remove the magazine gate, hold the rear part of the gate and receiver in a padded vise or by some other means, the lip on the hinge pin pivoted up; the pin is then driven, or pulled forward, all the way out. On removal from the vise, the gate can be lifted off and the follower spring lifted out. Swing the follower to the right, and it can be pushed downward and removed. Do not remove the follower-

arm plate unless necessary, and then only by driving out its pin. Remove the sideplate screw, lift up the rear of the plate and remove it. Pull out the ejector pin with the fingers, and the ejector can be removed. Reassemble in reverse order. In assembling the follower spring, the rounded end must contact the lug on the follower. The barrel has a right-hand thread, but do not attempt to remove it from the receiver unless you have the proper tools.

Krag Steel and Heat-Treatment

According to *Hatcher's Notebook*, Krag barrels were made of Ordnance barrel steel, the same steel used to make 1903 Springfield barrels. The receiver was made from Springfield Armory Class C steel (later known as W.D. 1325), the same steel used in the so-called low-numbered 1903 Springfields. Alloyed with carbon, manganese, silicon, sulphur and phosphorus, it was given a lengthy heat-treatment which resulted in the receiver becoming very hard throughout, but having a harder outside surface. The bolt was most likely made of a steel different from that used in the receiver, but it, too, was thoroughly case-hardened to a considerable depth. After precisely machining and polishing the receiver and bolt, as well as those parts which rubbed together, the result was a very smooth-working action.

Only the single front locking lug holds the bolt closed against the thrust of firing. The guide rib clears the bridge by a few thousandths of an inch, and the base of the bolt handle, which has still more clearance, acts as auxiliary safety lug only. The Danish Krag (chambered for the 8x58R Danish cartridge) and the Norwegian Krag (chambered for the very fine 6.5x55mm cartridge), while essentially the same as the U.S. Krag, were probably made of better steels and given a better heat-treatment. They were also made with the guide rib bearing on the receiver bridge, so that these bolts have two locking lugs instead of one. This foreign Krag locking arrangement greatly strengthened the locking system. As a result, they could handle the powerful cartridges for which they were chambered. Both are more powerful than the 30-40.

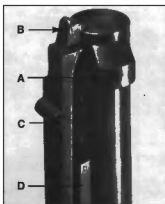
Perhaps because of over-hardening the bolt, or because of improper heat-treatment, and by the fact that only the front lug bore against the receiver, many U.S. Krag bolts cracked just behind the lug. This was very serious because the guide rib immediately took over the job of locking the bolt. However, cracked bolts should be replaced. I have never seen a cracked Krag receiver, but I have seen a couple of cracked bolts. In both cases, I blamed the failure on the shooter. In one instance, I believe the shooter was using too heavy handloads; in the other, the action was rebarreled to a cartridge much too powerful for the action. At any rate, the U.S. Krag action would have been considerably stronger had it been made with the guide rib bearing against the receiver. It can be made stronger if the bolt is lapped so the guide rib bears against the receiver equally with the front locking lug. Used only with commercial 30-40 cartridges, however, which are normally factory loaded with breech pressures well under 40,000 psi, or if used with handloads which develop no more pressure than this, then the "as issued" Krag action is sufficiently strong and safe.

At this point, it might be interesting to relate what one well-known gunsmith thought of the Krag action.

This man was the late R.F. Sedgley of Philadelphia, best known for his custom 1903 Springfield and Winchester High Wall sporters. Since he was in business when the DCM was releasing Krags, he naturally was called upon to work on them. If my memory serves me right, I recall reading that it was common practice, when a Krag rifle came into his shop, to testfire it first by screwing a 30-06 barrel into the action, and then firing several heavy 30-06 loads through it. I think he had a high regard for the Krag action and that few of them failed to pass this test. He did not, of course, advocate using this action for more powerful cartridges than the 30-40, since this action will hardly handle any other cartridge through the magazine. He did, however, manage in one way or another to alter the magazine of the Krag to handle the 25-35 cartridge. One such, a fine Sedgley Krag sporter, was once described in *The American Rifleman*. I have no idea of how Sedgley altered the magazine system to handle this cartridge. I attempted a similar conversion on several occasions, but I could never make it work. While Sedgley and other gunsmiths may have thought well of the Krag, many present-day gunsmiths have a very low opinion of them—and some are not hesitant to say so.

Gunsmithing the Krag

Much has been written on gunsmithing the Krag, so I will not go very deeply into this subject. For example, the older gunsmithing books



U.S. Krag-Jorgensen bolt head, showing locking lug (A), extractor (B), bolt-stop pin (C), and guide rib (D).

like *Modern Gunsmithing* and *The Modern Gunsmith* contain considerable information on the subject. Also, practically every issue of *The American Rifleman* from the mid-1920s to the late 1940s carried something on this rifle.

As for the availability of Krags for gunsmithing (remodeling, sporterizing, rebarreling, etc.), consider the following: All told, there were about 442,883 Krag rifles and about 63,116 Krag carbines made between 1894 and 1904; practically all of them were disposed of by the military years ago, most of them going to NRA members who bought them through the DCM, but a great number of them went to American legion posts for parade use. Krag rifles and carbines in very good or excellent condition, and in original, "as issued" state, have become collector's items, so some thought should be given before such a gun is altered. I would estimate, however, that at least half of the Krags which were sold through the DCM in the 1920s have since been altered, remodeled or converted in one way or another, and such guns rarely have any value to a collector. Such altered Krags are continually being put up for sale, and I'd imagine that most of them only underwent minor remodeling to start with. These guns are still entirely suitable for re-gunsmithing. Separate Krag actions probably are impossible to find today, but an ordinary used and remodeled complete Krag rifle will probably cost no more than a separate action, if one could be found.

Because so many Krag rifles have been remodeled in recent years, collectors of military long arms have started another trend. Beginning collectors often buy a remodeled Krag and then attempt to restore it to its original military configuration by purchasing an issue stock and other parts. Issue Krag stocks,



Top view of the Model 98 Krag action showing bolt and magazine gate open.

handguards and barrels, however, are extremely hard to come by.

As long as there are non-original Krag rifles around, you will be able to obtain such accessories as a low-scope safety, single-stage adjustable trigger, rear receiver sight, semi-inletted/shaped stocks, ramp rear sights, and front sight bases and sights. Because the Krag ejects the fired cases nearly straight up, mounting a hunting scope low and centrally over the action is not entirely satisfactory. I've rebarreled a number of Krags with Springfield barrels, and they are entirely satisfactory for the purpose. I know one shooter who had the pitted barrel of his Krag rebarreled and rechambered for a wildcat 35-caliber cartridge based on the 30-40 case with good results.

Other than the above mentioned 35 wildcat, and if the rifle is to remain a repeater, then

PART I: Military Rifles & Actions

the only other cartridge choice is the 30-40. As I've said before, I know of no method by which the Krag magazine can be altered to handle any cartridge with dimensions much different from the 30-40 case.

I mentioned that the only two readily available cartridges which will work through the magazine of the U.S. Krag-Jorgensen action are the 30-40 and the 303 British. While this is still true, I now can add another cartridge to this short list. Bob Johnson and my son, Mark, were checking over a Krag rifle to see what they could do with it when they accidentally discovered that the old action came within a hair's breath of feeding the 444 Marlin cartridge. Using a Dremel tool, files and emery paper, and working in the front of the magazine opening in the receiver, they soon had the action altered to feed the 444.

Years ago, when Krag rifles were cheap and plentiful, a great many of them were remodeled and converted into sporters. Many of these remodeling jobs were poorly done. One by one, these old rifles are being given away, traded or sold. So, if you have a Krag that is not original, and if you want an open-sighted big bore turnbolt rifle for hunting deer, bear and boar in thick cover, then consider rebarreling the old action to the 444 Marlin caliber. Get a couple of 444 cartridges and check them out in the action to see what alteration is required to feed them. Talk it over with your gunsmith. I would suggest using a barrel with a rifling twist of 1:16" or 1:20", and especially so if you want to use bullets of 260 grains or heavier.

The Krag action, however, is suitable for rebarreling to other cartridges, if the rifle is used as a single shot. In years past, a great many 22 Hornet rifles were built on the Krag action. When the 219 Zipper cartridge was first introduced, I built several single shot Krags in this caliber. Other gunsmiths would regularly rebarrel these actions to the 22 Baby Niedner (32-20 case), 22 R-2 Lovell (25-20 S.S. case) and 22 Niedner Magnum. Since the rifle had to be used as a single shot, the common practice was to remove as much of the



Top view of the Norwegian Krag-Jorgensen action.

surplus action metal as was possible and inlet the trimmed and lightened action into a new stock, so the scars of removing the metal and remaining magazine-well openings would be concealed.

In rebarreling the Krag, I certainly recommend enough honing and lepping in the front locking lug so that the guide rib will contact the receiver equally with the locking lug. Doing this will definitely make the old Krag action a bit stronger and may possibly prevent the bolt from cracking at the front lug area. I believe it was G&H's practice to do this lap-in job on the Krags they rebarreled. But even with the two locking lug system, I still do not consider this action suitable for rebarreling to a cartridge such as the 225 Winchester.

In fitting the Krag with a sporter stock, an inside barrel band should be used, placing it about three-quarters of the way up the forend to hold it against the barrel. I also advise routing out grooves in the stock, inletting to the rear of the magazine and glass-bedding this

area to evenly distribute the thrust of the recoil. This should prevent the stock from splitting at this point.

The 30-40 Cartridge

Originally known as the "U.S. Caliber .30 Government" or ".30 U.S. Army" cartridge, it was introduced with the Krag in 1892. Today, and for years past, it was most commonly called the 30-40 Krag, or simply the 30-40. The 30-40 designation was given to it many years ago, probably soon after Winchester and other arms makers began chambering some of their sporting rifles for it. For example, the Model 95 Winchester lever-action repeater and the Model 1885 Winchester single shot rifle were chambered for the 30-40 as early as 1896. Beginning back in the blackpowder cartridge era, it was common practice to name metallic rifle cartridges by two sets of digits. The first two figures roughly represent the caliber, while the last two indicated the amount (in grains) of blackpowder used. Although the 30-40 Krag





Model 1889 Danish Krag rifle.



Danish Krag action open.

cartridge was developed in the smokeless-powder era, the "40" in the designation merely indicated that its case had a powder capacity approximately 10 grains more than the 30-30 cartridge, and therefore was comparatively more powerful than the latter.

The 30-40 cartridge would probably have been a very popular one even without the Krag rifle because, long before Krag rifles and carbines were released for sale, the 30-40 had proved to be quite adequate for hunting most species of North American big game.

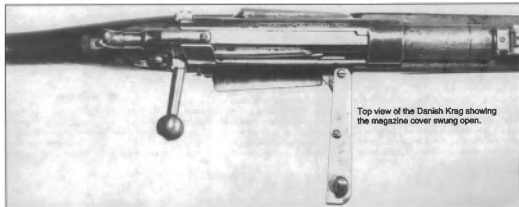
For military use, it was normally loaded with a full-jacketed, round-nosed 200-grain bullet, the muzzle velocity 200 fps. At various times in its long history, it was commercially loaded with full-jacketed and softpoint bullets of various weights, but mostly with 220- and 180-grain softpoints or some other type of expanding bullet.

The Norwegian Krag

Norway adopted the Krag rifle in 1894. The action of this rifle is not much different from the U.S. Krag, and a close study of the photographs will reveal most of the differences. The first Norwegian Krags (20,000 of them) were produced for Norway by the great Austrian arms makers in Steyr, and they can be identified by the word **STEYR** stamped on the receiver. The rest of the many Norwegian Krags were made in Norway by the Kongsberg Vapenfabrik, a government-owned arsenal in the town of that name. These rifles can be identified by an ornate letter K beneath a crown, stamped on the receiver ring. The date (year) of manufacture is normally stamped on the receiver ring, and they probably were made as late as 1930. According to the *The Book Of Rifles* by

W.H.B. Smith, a few were also made in the late 1940s for target shooting. Various models of the military rifles and carbines were made, as well as a sporting model. Unlike the U.S. Krags, all were made with a pistol grip stock and for the 6.5x55mm cartridge, which has a rimless case.

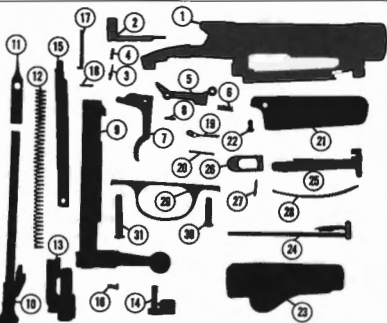
As can be seen in the photographs of the U.S. and Norwegian Krag actions, there are numerous minor outward differences. For example, the safety is different, and it is retained in the bolt sleeve with a cross screw; the extractor is retained with a screw and has a near-center auxiliary spring; various parts have different contours, such as the magazine gate and receiver, which has a hollow groove milled in the receiver wall. The Norwegian action is several ounces lighter in weight than the U.S. Krag action. Many of the Norwegian Krags have flattened bolt handle knobs, the



Top view of the Danish Krag showing the magazine cover swung open.

Parts Legend

- 1 Receiver (side view)
- 2 Magazine cutoff
- 3 Magazine cutoff plunger
- 4 Magazine cutoff plunger spring
- 5 Sear
- 6 Sear spring
- 7 Trigger
- 8 Trigger pin
- 9 Bolt
- 10 Striker
- 11 Firing pin
- 12 Main spring
- 13 Bolt sleeve
- 14 Safety
- 15 Extractor
- 16 Extractor rivet
- 17 Auxiliary extractor spring
- 18 Bolt stop pin
- 19 Ejector
- 20 Ejector pin
- 21 Magazine cover plate
- 22 Magazine cover plate screw
- 23 Magazine cover box
- 24 Magazine cover box hinge pin
- 25 Follower arm
- 26 Follower arm plate
- 27 Follower arm plate pin
- 28 Follower arm spring
- 29 Trigger guard
- 30 Front trigger guard screw
- 31 Rear trigger guard screw



Krag-Jorgensen

Dimensional Action Specifications

Weight	.50 ounces
Overall	8.312"
Receiver ring dia.	1.30"
Bolt body dia.	.630"
Bolt travel	.800"
Striker travel	.800"
Bolt face recess:	
Dia.	.555"
Depth	.060"

flattened surfaces checkered. There are also several differences inside the action; for example, the barrel thread is entirely different—it is one of the few rifle actions with a left-hand thread. In fact, there are probably no parts of these two actions that are interchangeable.

As pointed out early in this chapter, the Norwegian Krag action is so made that both the forward locking lug and the guide rib contact the receiver when the bolt is fully locked and closed. This, plus the fact that most Norwegian Krags were made years after the U.S. Krag was discontinued, makes it almost certain that Norwegian actions were made of a better quality steel, and this steel given a more controlled and uniform heat-treatment. All in

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece machined steel forging with slotted bridge.
Bolt	One-piece with single forward locking lug. Guide rib on bolt and base of bolt handle act as an auxiliary safety lugs.
Ignition	Firing mechanism composed of striker rod with integral cocking piece, separate firing pin and coil mainspring. Cocks on opening.
Magazine	Non-detachable five-shot horizontal hinged-box type.
Trigger	Non-adjustable, double-stage military type.
Safety	Rotary wing-type built into the bolt sleeve. 180° swing, locking both bolt and striker when in the UP or RIGHT position.
Extractor	Non-rotating bar-type, attached to bolt sleeve, has auxiliary spring.
Bolt-stop	Locking lug serves as bolt-stop.
Ejector	Pivoting lever positioned in bottom of receiver. Cases eject upward.

all, the Norwegian Krag action is superior to the U.S. Krag action, and early Norwegian actions, which reveal the most precise machining and finishing, are even smoother in operation than the U.S. counterpart.

Operation of the Norwegian Krag is the same as the U.S. Krag, and the action is loaded in the same way. Many Norwegian Krag rifles were sold on the surplus arms market during the 1950s, so they are fairly common. No one makes a replacement safety or trigger. William Gun Sight Co., makes a receiver sight to fit the rifle.

While I do consider the Norwegian Krag

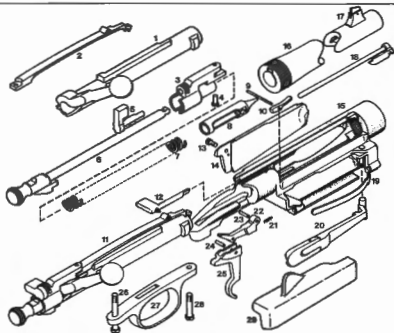
action stronger than the U.S. Krag action, I would limit its use to the standard factory-loaded 6.5x55mm Norma cartridge or to handloads which develop somewhat less breech pressure. This action was made for the 6.5x55 cartridge, which it will handle better than any other.

The Danish Krag

As mentioned earlier in this chapter, the Krag-Jorgensen rifle originated in Denmark and was first adopted as a military weapon by that country in 1889. The various models were made by Gevaerfabriken Kjobenhavn

Parts Legend

- 1 Bolt Body
- 2 Extractor
- 3 Bolt Sleeve
- 4 Extractor Rivet
- 5 Safety
- 6 Firing Pin Assembly
- 7 Main Spring
- 8 Striker
- 9 Ejector Pin
- 10 Ejector
- 11 Bolt Assembly
- 12 Magazine Cutoff
- 13 Slideplate Screw
- 14 Slideplate
- 15 Receiver
- 16 Barrel
- 17 Front Sight
- 18 Hinge Bar
- 19 Magazine Spring
- 20 Carrier and Follower Assembly
- 21 Sear Spring
- 22 Sear
- 23 Sear Pin
- 24 Trigger Pin
- 25 Trigger
- 26 Rear Guard Screw
- 27 Trigger Guard
- 28 Front Guard Screw
- 29 Magazine Gate



(Copenhagen Arms Manufactory) and Haerens Tøjhus (Army Arsenal), and were so marked on the left side of the receiver. The model designation, as well as the date (year) of manufacture, is stamped on the left side of the receiver also.

Several models were made, but the most common one seen in the U.S. is the Model 89 rifle with a 32.75" barrel. Like the German M88 Commission rifle, the Danish M89 rifle has a thin metal tube over the barrel to serve as a handguard. The rifle weighs about 9.5 pounds and is 52.3" overall.

Less common Danish Krags are the M89 infantry carbine with 23.63" barrel, which has the letter F in front of the serial number; the M89 artillery carbine with 24.02" barrel and the letter A preceding the serial number; the M89 engineer carbine with 23.53" barrel (with wood handguard) and the letter I before the serial number; the M89 cavalry carbine is like the engineer's carbine, but has the letter R before the serial number; the M1928 sniper's rifle with 26.50" barrel of heavy weight, with globe front and rear sights, and marked with the letters FSK, which means "sniper's rifle;" and the Danish single shot target rifle. This last is similar to the sniper's rifle, but is a single shot without magazine cuts in the receiver.

All of these Krags, both rifles and carbines, are chambered for the Danish 8mm

(8x58R) rimmed cartridge. The single shot target rifle was chambered for the 6.5x55 Swedish Mauser cartridge.

The Danish Krag repeating action is very similar to the U.S. Krag action except for the following: 1) The magazine cover, hinged near the front, opens by swinging out and forward. It has a checkered knob-type catch on its top rear surface to hold the cover closed and acts as a handle to open it. When open, cartridges are merely rolled into the magazine. 2) The safety is a round, checkered button positioned on the right side of the tang behind the bolt handle. Pressed to the left and swung back, the rifle is ready to fire and the bolt can be operated. Swung forward, the safety locks the bolt and sear. It can't be swung forward unless the striker is cocked. 3) The cocking piece has a stubby "hook" with its front curved surface checkered. By grasping this hook with the thumb, the striker can be manually cocked or the cocked striker lowered, either to the full down position or to a half-cock position. When in the half-cocked position, the safety can be engaged. 4) The ejector is a thin leaf spring mounted in a groove in the bottom of the bolt raceway. 5) The receiver magazine cover or plate is shaped and attached to the receiver differently than other Krags.

Like other Krags, the Danish actions are well made and finished, and are very smooth

in operation. The bolt head is recessed, and the bolt is disassembled and removed from the receiver just like the U.S. Krag. Unlike the U.S. Krag, but like the Norwegian Krag, the forward locking lug and the guide rib contact the receiver to take up the rearward thrust of firing a cartridge in the chamber. For this reason, the Danish action is considered to be a bit stronger and better than the U.S. action.

Here are some dimensional specifications for the Danish Krag repeating action: Receiver diameter, 1.365"; bolt diameter, .700"; bolt travel, 3.710"; striker travel, .500"; bolt face recess diameter, .590"; bolt face recess depth, .060"; magazine length, handles certain rimmed cartridges no longer than about 3.20" overall.

The Danish Krag single shot target action was made with a bolt face recess to accommodate the 6.5x55 Swedish Mauser cartridge, which has a .480" case head diameter. In the early 1960s, several firms offered these actions for sale, and they were an excellent choice on which to build a long-range target rifle in the 6.5x55 caliber.

Like the other Krags, the Danish action should not be used with cartridges which develop much over 45,000 psi breech pressure. It has the best safety of all the Krags. There is no commercial trigger mechanism made for the Danish Krag.



Lee-Enfield Rifles

The No. 1 Mk. III Action

The Lee-Enfield receiver (called the "body" in England) is a one-piece steel forging which required a great many machine operations before it was finished. It is more complex than the usual centerfire turnbolt action because of the two-piece stock design; the separate buttstock is attached to the rear of the receiver (called the "butt socket") by a through-bolt. The receiver forging was made with a large mass of metal on its rear which was milled and threaded to accept the buttstock tenon and the through-bolt. This is a very secure and rugged stock fastening.

The front end of the receiver has right-hand threads of the common V-type. A heavy collar is left inside the rear of the receiver ring against which the flat breech end of the barrel butts. The barrel is also made with a reinforced shoulder which butts against the front of the receiver, making a rigid barrel-to-receiver joint. A slot cut through the right side of the collar (and a matching beveled notch in the breech face of the barrel) admits the extractor hook. The collar closely surrounds the front of the bolt head and provides a good seal at the breech. Neither the face of the barrel (chamber) nor the bolt head is recessed for the cartridge head. Since the cartridge rim is nearly the same diameter as the bolt head, the head is so well sealed that a recoil is not needed.

The center of the receiver is bored and milled to accept the two-piece bolt. The receiver bridge is slotted to allow passage of the right locking lug/guide rib and the extractor lug on the bolt head.

The heavy left wall of the receiver is slightly lower than the top of the receiver ring line. A shallow thumb notch is cut into it to aid in loading the rifle from the top through the opened action. The right wall is milled much lower than the left, providing ample opening for loading and ejection.

(Pictured above) British SMLE Mark III rifle, which later became the No. 1 Mark III.

THE BRITISH LEE-Enfield rifle has a long and colorful history; one which includes two World Wars, many smaller wars and conflicts covering wide areas and many countries over the face of the earth. The "Lee" of Lee-Enfield is James Paris Lee, a Scottish-born American firearms designer who invented the Lee turnbolt magazine firearm in 1879. A book could be written about the life and work of this inventor; it would be an interesting challenge for some biographer. "Enfield" derives from the Royal Small Arms Factory at Enfield Lock in England, a great arms manufacturing plant where, for many years, most military development work was done on arms later adopted by Great Britain.

Many articles have been written about Lee and his turnbolt rifle that was the forerunner of the British Lee-Enfield. The reader need only check the bibliography at the back of this book to find a few of the articles published in *American Rifleman*. In addition, there is an excellent book on Lee-Enfields—*The Lee-Enfield Rifle*, by Major E.G.B. Reynolds—must reading for anyone interested in these arms. Because of this wealth of background material, I won't go deeply into the history and development of this famous military rifle. I will limit my main discussion to the two Lee-Enfield actions used during two World Wars: The No. 1 Mark III of WWI and the No. 4 Mark I of WWII.

A very brief historical outline of the Lee-Enfield, however, is in order. After Lee patented his vertical magazine turnbolt action in 1879, he was not immediately successful in getting the rifles made and sold. He tried to interest the U.S. Navy in the design, but it was not until the Remington Arms Co. of Ilion, New York, bought the manufacturing rights that the Lee rifle had any worthwhile backing. Known as the Remington-Lee rifle, a few were sold to the Navy for experimental purposes in 1881. Remington tried in vain to interest the U.S. Army in the same rifle. Meanwhile, Remington also tried to interest foreign countries in the new rifle (some samples were made for China and Japan, among others) and did sell some to Cuba and Spain.

At about this time (1883), England became interested in adopting a magazine rifle, and the Lee rifles submitted came out best in their 1887 trials. This brought Lee his first real taste of fame. The Remington firm then began making Remington-Lee sporting rifles for a variety of cartridges, eventually including the 6mm Lee, 30-30, 30-40, 303 British, 35 Remington, 45-70 and others. Remington made these rifles until about 1906.

After England's initial acceptance, the Lee system was somewhat modified with development and manufacturing done at Enfield. The first British Lee rifle was the Lee-Metford Magazine Rifle Mark I, the design sealed in December, 1888. Various improvements and modifications followed with the first true Lee-Enfield being introduced late in 1895.*

This was followed by other changes, modifications and mark designations every few years or so until the Mark III was adopted in 1916 as the Short Magazine Lee-Enfield (SMLE) No. 1 Mark III.

The Rifles

The No. 5 Mark I carbine weighs about 8.9 pounds, has a 25.2" barrel and is 44.8" overall. It has a full length forend, and the rear sight is mounted on the barrel.

The No. 4 Mark I rifle, about 8.6 pounds, has a 25.2" barrel and is 44.4" overall. Its forend extends nearly to the muzzle, and the rear sight is mounted on the receiver bridge. It was adopted in 1911.

The No. 5 Mark I carbine weighs about 7.2 pounds, has a 20.5" barrel and is 39.1" overall. Often called the "Jungle Carbine," it has a short sporter-type forend and a funnel-like flash hider on the muzzle, but is otherwise like the No. 4 rifle. It was introduced in 1944. All Lee-Enfields were discontinued in 1954.

* These first official Lee-Enfield rifles had barrels cut with Metford's segmental, shallow-land rifling. The Carbine powder then used was highly corrosive, soon ruining the Metford barrels. Enfield rifling—essentially similar to today's standard rifling, and a Metford design too, in fact—offered much deeper, and somewhat wider, lands to the hot powder gases. Barrel life was considerably extended.

The receiver bridge is slotted through. It is, however, bridged over by the narrow clip-charger guide bridge over the middle of the receiver, connecting the high left wall with the low right wall. It appears that this clip-charger bridge was made from a separate piece of metal, then afterward forged to become integral with the receiver. The top front of this bridge is grooved to accept the 303 British stripper clip.

The two-piece bolt has a separate bolt head threaded into the front of the bolt body. The small hooked extractor fits in a slot through a lug on the bolt head, and is held in place by, and pivots on, a screw through the underside of the lug. A small but sturdy flat V-spring tensions the extractor. The extractor easily snaps over the rim of a cartridge placed in the chamber.

The bolt has dual-opposed locking lugs located slightly to the rear of its center. The left (bottom) locking lug engages in a recess milled into the left wall of the receiver bridge. The long guide rib on the right (top) of the bolt is also the right locking lug—it engages forward of the receiver bridge wall, on the right. Both lugs are solid, and the rear locking surface of each is slightly angled to cam the bolt forward as it rotates to the fully locked position. In addition, the front surface of the left lug is also angled to match the surface in its locking recess. This provides the initial extraction power when the bolt handle is raised. The bolt handle, at the extreme rear end of the bolt, has a tapered square-to-round stem that ends in a round grasping ball. When the bolt is closed and locked, the bolt handle lies against the butt socket of the receiver, with the grasping ball only slightly away from the side of the rifle. There is no auxiliary locking lug on the bolt.

The bolt head does not turn with the bolt. As the bolt is fully closed, the threads of the bolt head draw it against the front of the bolt—so the thrust of firing is not placed on the threads. The large lug on the bolt head housing the extractor also acts as the bolt-stop when it contacts the receiver bridge wall as the bolt is opened. A lip under the outside edge of the extractor lug fits over a groove cut into the top edge of the right receiver wall, and this keeps the bolt head from turning as the bolt is operated. This groove ends short of the receiver bridge wall. When the bolt is fully open, the extractor lug can be pulled up and rotated into a slot in the receiver bridge—the bolt can then be removed. A small spring retainer, provided in the right side of the receiver extractor-lug groove, engages with the lip under the extractor lug when the bolt is fully drawn back. It prevents the bolt head from turning under normal operation of the bolt, yet allows the bolt head to be rotated manually to remove the bolt from the action.

The firing mechanism consists of a one-piece firing pin, coil mainspring and cocking



No. 1 Mark III action.

piece. The bolt is drilled from the front, with the mainspring compressed between a collar on the front of the firing pin and a rear shoulder in the bolt body. The rear end of the firing pin is threaded into the cocking piece. A screw at the rear of the cocking piece prevents the firing pin from turning. Forward travel of the firing pin is stopped when the collar on the firing pin contacts the back of the bolt head, not by the cocking piece contacting the rear of the bolt.

An arm or tongue on the bottom of the cocking piece extends forward under the bolt body, into a raceway milled in the receiver, where it engages the sear and safety projecting into this raceway. The action cocks on closing the bolt, the sear engaging the front of the cocking piece arm and holding it back as the bolt is closed. The head of the cocking piece may be round and knurled, or flat and notched. There is also a half-cock notch (called "half-bent" notch in England) on the arm of the cocking piece; by firmly grasping the cocking piece, it can be lowered from the cocked position or drawn back from the fired position to engage the sear in this intermediate position. This locks the bolt and the sear. To fire the rifle in this half-cock position, the cocking

piece must be manually pulled back to full cock. Originally designed as a safety measure, the half-cock notch serves no useful purpose. There is also a small stud or cam on top of the cocking piece arm which engages a notch cut in the rear of the bolt body. On raising the bolt handle with the action closed and the striker down, the notch engages the stud and pushes the cocking piece and firing pin back. The purpose of this arrangement is to prevent the firing pin from going fully forward unless the bolt is locked. In other words, the Lee-Enfield action cannot be fired unless the bolt handle is nearly all the way down and the action locked.

The safety is at the left rear side of the receiver. A flattened integral stud on the safety projects into the cocking piece raceway. Two shallow notches cut into the left bottom edge of the cocking piece arm can engage the safety when it is swung back. These notches are so spaced that one or the other is opposite the safety when the rifle is cocked or uncocked. When the action is cocked, the safety locks both the striker and bolt; when uncocked, it locks the bolt and pulls the firing-pin tip within the bolt head so that a blow on the cocking piece cannot discharge the rifle.



Left-side view of the No. 1 Mark III Lee-Enfield action.

PART I: Military Rifles & Actions



Top view of the No. 1 Mark III action showing cutoff pulled out; the bolt will pick up cartridges from the magazine as the bolt is operated.

The bolt is locked by a small part threaded on the stem of the safety. The thread is multi-threaded and left hand. Part of this bolt lock extends through the receiver wall to engage in a groove cut into the rear of the bolt body. As the safety is swung back, the threads force the bolt lock toward the right to engage a groove in the bolt and lock it. A spring bracket screwed to the receiver holds the safety in place. (In England and perhaps elsewhere, the part which I call the "safety"—the part which actually locks the striker—is called the "locking bolt," and the part I call the "bolt lock," which actually locks the bolt, is called the "safety catch.")

The sear, an L-shaped piece of metal, is held in place by, and pivots on, a screw under the receiver. This screw also holds the bolt-head release spring. It is under tension from a flat V-spring positioned between the sear and magazine catch which also supplies tension to these parts. The trigger pivots on a pin in the trigger guard. The curved trigger is grooved; its top part, which contacts the sear, has two bumps which provide the common double-stage military pull.

The detachable staggered-column box magazine, of ten-round capacity, is made from heavy-gauge sheet metal. The follower has a raised rib on its left side which causes the cartridges to lie staggered in the magazine. The follower is tensioned by a W-shaped spring. Curved lips at the front and rear of the magazine opening hold the cartridges in the magazine.

The magazine box, positioned in the milled-out bottom of the receiver by the trigger

guard/magazine plate, is held up by the magazine latch. Partial cartridge guide lips, milled into both sides of the magazine well, hold and guide the cartridges into the chamber as they are fed out of the magazine by the bolt. The magazine can be single loaded whether in or out of the rifle, or it can be loaded with a stripper clip while in the rifle.

The No. 1 SMLE action has a cartridge cutoff, a flat triangular piece of metal positioned in a slot milled in the right receiver wall. It pivots on a screw through the bottom front edge of the receiver. Pushed in (engaged), the cutoff slides over the cartridges in the magazine, so the bolt can be closed without picking up a cartridge. This allows single-round loading, holding the cartridges in the magazine in reserve. Pulled out, the cutoff is inoperative, letting the bolt pick up the top-most cartridge in the magazine as it is closed.

The ejector is merely a small stud screw threaded into the left receiver wall. When the bolt is opened, the extracted case or cartridge slides along the inside wall of the receiver until its head strikes the end of the ejector screw—the bolt nearly all the way open. This tips the case to the right, out of the action.

A gas-escape hole in the bolt head vents any powder gases which might enter the firing-pin hole in the case of a pierced primer. It vents the gases upward along the edge of the left receiver wall. There is another small oblong gas-escape hole in the left side of the receiver ring, in line with the space occupied

by the cartridge rim between the face of the bolt and barrel. There is also a notch cut into the rear of the receiver ring, just ahead of the extractor lug on the bolt head; this space, and the oblong hole opposite it, should expel any gases escaping from a ruptured case head.

A new system of model designation was introduced in May, 1926. The SMLE Mark III became the No. 1 Rifle, Mark III. The Pattern 1914 Rifle (known in the U.S. as the 1917 Enfield) became the No. 3 Rifle. The No. 4 Rifle, Mark I, was a development of the SMLE Mark VI.

The No. 1 Lee-Enfield (also known as the SMLE, for Short Magazine Lee-Enfield), introduced shortly after 1900, underwent many changes before the No. 4 Lee-Enfields were introduced about 1939. We are not concerned here with the many minor changes in the action, since it remained structurally the same. Officially, as such change was adopted, the model designation was changed, beginning with Mark I and continuing to Mark VI and including such asterisk or "starred" (*) designations as the Mark I*, etc., etc. The No. 1 action itself remained substantially the same for over 30 years, and since it was made in large quantities, it is the most common one.

The No. 4 Lee-Enfield Action

Little development was done on the Lee-Enfield rifle after WWI since the rifle and action had proved reliable during that conflict. Nor was there much need to make many additional rifles—at least not until WWII loomed into sight. However, it had been previously found that the rifle could be simplified and improved, and the action made somewhat stronger. The development work done accordingly was toward making the rifle more accurate, simpler and stronger. For example, it was found that the rifle gave better accuracy with an aperture sight mounted on the receiver and that there was no real need for the magazine cutoff. Thus, in the late 1930s, when the British again needed rifles, they adopted the Mark VI, a simplified and improved version that became the No. 4 Lee-Enfield.

Here are some of the changes adopted:

1) The cutoff was eliminated, the machin-



Top view of the No. 1 Mark III Lee-Enfield action. Magazine cutoff is shown depressed.



No. 1 Mark III Lee-Enfield action, open, shown with stock bolt.

ing for it omitted. This left the right receiver wall stronger than before, simplified and stiffened the action, and left more metal in the right wall to support the right locking lug.

2) The bridge was made a bit higher so that a leaf aperture sight could be mounted.

3) The front of the bridge was also made a bit higher, so that a connecting strip of metal joining these projections formed a much smaller and neater clip-charger guide bridge.

4) The thumb notch in the left receiver wall was made shallower, further strengthening the receiver.

5) The bolt head was altered, as well as the method by which it was guided and retained. The extractor lug was made smaller, and instead of engaging over the edge of the right receiver wall, it moved in a groove cut inside the wall. On early No. 4 actions, a plunger-type bolt head release, fitting in a mortise cut into the receiver, could be depressed to release the bolt head. Later, this release was omitted; instead, a notch cut out of the bolt head groove in the front of the right receiver wall allowed the bolt head to be rotated at this point for removal of the bolt from the action. With this change, the rifle became the No. 4 Mark I*.

6) The safety shape was changed and a new safety spring used, eliminating the safety washer.

7) The left side of the bolt head was made flat to allow a greater amount of powder gases to escape out of the bolt head hole and past the receiver wall. The gas-escape hole in the left of the receiver was enlarged and made round.

In addition to the above, a groove was milled in the right locking lug/guide rib to

make the bolt lighter. There are a number of changes in the configuration of the receiver which were the result of eliminating or simplifying the machining operations:

On late No. 4s, the trigger was pivoted in the receiver instead of in the trigger guard. The No. 4 actions in which the trigger was pivoted in a bracket brazed on to the butt socket became the Mark 1/2. Later, when the brazed-on bracket was eliminated and the trigger pivoted directly to the butt socket, the designation was changed to Mark 1/3.

The No. 5 Lee-Enfield Jungle Carbine has the same action as the No. 4.

Takedown and Assembly

Make certain the rifle is unloaded. Remove the magazine by lifting up the magazine latch in the trigger guard and pulling it out of the action.

Disassemble the magazine by depressing the rear of the follower until its front end slips out of the magazine box, then gently lift out the follower and follower spring. Reassemble in reverse order.

Remove the bolt from the No. 1 Mark III by raising the bolt handle and pulling the bolt back as far as it will go; then rotate the bolt head by lifting up on the extractor lug, and the bolt can be pulled from the action. To remove the bolt from the early No. 4 rifle, first tip up the rear sight, depress the bolt head release and open the bolt as far as it will go; now rotate the bolt head counterclockwise and pull the bolt from the receiver. On the late No. 4, open the bolt and pull it back about 1/2", or until the bolt head can be rotated, then pull the bolt from the receiver.

To disassemble the bolt, unscrew the bolt head, remove the extractor screw, then pull out the extractor spring. Turn out the firing-pin lock screw from the cocking piece. Using the special tool shown, insert it into the front of the bolt and, while pressing the firing pin down with this tool, unscrew the firing pin from cocking piece. Reassemble in reverse order.

Remove the safety mechanism by turning out the safety-spring screw and lifting the safety-spring and safety parts from the receiver. If the bolt lock is removed from the safety, it must be re-aligned on the threads so that it will fit the hole in the receiver with the safety in the forward (FIRE) position.

Remove the buttstock by opening the buttplate trap and removing the felt wash that covers the stock bolt head; use a large, long-bladed screwdriver to unscrew the stock bolt. Remove the trigger guard/magazine plate by removing the rear and front trigger-guard screws, then lift it out of the forend. Remove the muzzle cap and barrel bands, then gently pull the forend away from the barrel and action.

On the No. 1 Mark III, turn out the magazine cutoff screw and remove the cutoff. Drive out the magazine-catch pin and remove the catch and spring. Turn out the bolt-head release-spring screw and remove the release spring and sear. Reassemble in reverse order.

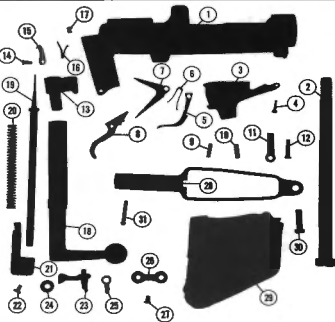
On the No. 4, turn out the magazine-catch screw and remove the bolt-head release stop, bolt-head release, bolt-head release spring, magazine catch and spring. Drive out the sear pin and remove the sear. Drive out the trigger pin and remove the trigger. Reassemble in reverse order.



British Lee-Enfield No. 5 Mark I Jungle Carbine.

Parts Legend No. 1 Mark III

- 1 Receiver
- 2 Stock bolt
- 3 Magazine cutoff
- 4 Magazine cutoff screw
- 5 Magazine latch
- 6 Sear/magazine latch spring
- 7 Sear
- 8 Trigger
- 9 Trigger pin
- 10 Sear pin
- 11 Bolt head spring
- 12 Bolt head spring/magazine latch screw
- 13 Bolt head
- 14 Extractor screw
- 15 Extractor
- 16 Extractor spring
- 17 Ejector
- 18 Bolt
- 19 Firing pin
- 20 Mainspring
- 21 Cocking piece
- 22 Firing pin lock screw
- 23 Safety
- 24 Safety stop washer
- 25 Bolt lock
- 26 Safety spring
- 27 Safety spring screw
- 28 Trigger guard
- 29 Magazine
- 30 Front guard screw
- 31 Rear guard screw



Markings

The No. 1 Mark III & III*. After assembly, each rifle was proved by firing two proof loads; these developed about 25 percent more breech pressure than the normal load. After inspection, if nothing was wrong with the rifle, British proof marks were stamped on the breech end of the barrel, receiver ring, bolt head and bolt body. The serial number was usually stamped on the barrel breech, receiver and stem of the bolt handle. The rest of the markings, stamped on the right side of the butt socket, include a proof mark, manufacturer, date and model designation as follows: A crown with the letters G.R. was stamped on top. Below this, the name or initials of the manufacturer was stamped; such as **ENFIELD** (for the Royal Small Arms Factory at Enfield Lock, Middlesex, England), **B.S.A.Co.** (Birmingham Small Arms Co., Birmingham, England) or **L.S.A.Co.** (London Small Arms Co., of London); below this and over the model designation would be the date (year) the rifle was made, as follows:

S.M.L.E.
III (or III*)

The letters "S.M.L.E." mean "Short Lee-Enfield." The No. 1 rifles made in India were stamped **ISHAPORE**, those made in Australia

were stamped **LITHGOW**, both cities in those countries. Various rifle parts also are stamped with inspector's or viewer's marks, which may be a number, a letter or both, often with a crown.

No. 4 Rifles were all made under more-or-less trying wartime conditions in a number of factories in England, the United States and Canada. The marking systems were so many and varied, and I can't list them all. To begin with, most No. 4s were proof marked, serial numbered and dated, generally marked with the model designation and the name and/or place of manufacture.

Proof marks were usually stamped on the barrel breech, receiver ring, bolt head and bolt body. Serial number and date (year) of manufacture were usually stamped on the left side of the butt socket.

The model designation, was usually stamped on the left side of the receiver, as follows: No. 4 MK I, No. 4 MK I*, No. 4 MK 1/2, or No. 4 MK 1/3. If there is a "T" after the mark designation, this indicates the sniper rifle. The No. 5 Carbines are marked "No. 5", followed by the mark designation.

Three firms in England made the No. 4 rifles. These firms were assigned blocks of serial numbers so that no two rifles would have the same number. The number was stamped (or sometimes etched) on the left side of the butt socket. Rifles marked with an **FY** or **ROF(F)** were from the Royal Ordnance Fac-

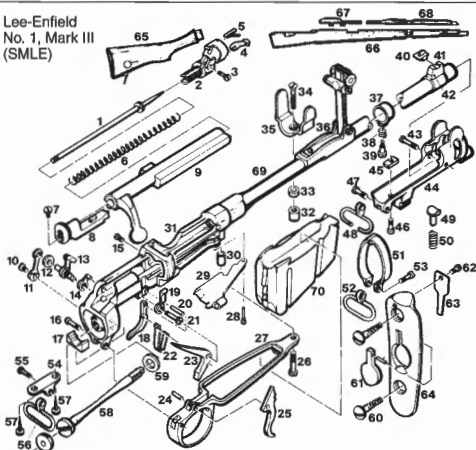
tory at Fazakerley, Lancashire, while those with an **M**, **RM** or **ROF(M)** came from the Royal Ordnance Factory at Maltby, Yorkshire. Those marked **B**, **85B** or **M 47** are from a BSA-controlled company in Shirley, near Birmingham. The word **ENGLAND** is often stamped on the receiver ring of these rifles.

The No. 4 Mark I* rifles made in the Long Branch arsenal near Toronto, Canada, were marked **LONG BRANCH** on the left side of the receiver. Rifles made in the U.S. by the Savage Arms Company (in the former J. Stevens Arms Co. plant in Chicopee Falls, Massachusetts) were stamped **U.S. PROPERTY** on the left side of the receiver. (They were made under the Lend-Lease arrangement between the U.S. and England.) The serial number of these U.S.-made rifles includes the letter **C**, for Chicopee Falls.

Production

A great many Lee-Enfield rifles were made. Hundreds of thousands of the No. 1 rifles were made at Enfield Lock, the factory that did most of the original development work on them. Over 2,000,000 were made at Enfield between August, 1914, and November, 1918. The large Birmingham Small Arms firm began making Lee-Enfields about 1903. During WWI, they made some 7000 to 10,000 a week, and during WWII they made about 1,250,000 of the No. 4 rifles. The factories in Australia made over

Lee-Enfield
No. 1, Mark III
(SMLE)



Parts Legend

- | | | |
|-------------------------------|----------------------------------|--------------------------|
| 1 Firing Pin | 23 Seer | 47 Stacking Swivel Screw |
| 2 Bolt Head, Stripped | 24 Trigger Pin | 48 Stacking Swivel |
| 3 Extractor Screw | 25 Trigger | 49 Forend Stud |
| 4 Extractor | 26 Front Guard Screw | 50 Forend Stud Spring |
| 5 Extractor Spring | 27 Trigger Guard | 51 Swivel Band |
| 6 Firing Pin Spring | 28 Cut-Off Screw | 52 Front Swivel |
| 7 Firing Pin Screw | 29 Cut-Off | 53 Swivel Screw |
| 8 Cocking Piece | 30 Guard Screw Bushing | 54 Butt Swivel Base |
| 9 Bolt Body | 31 Receiver | 55 Swivel Base Screw |
| 10 Safety Spring Screw | 32 Protector Nut | 56 Buttstock Swivel |
| 11 Safety Spring | 33 Forend Collar | 57 Butt Swivel Screws |
| 12 Safety Catch Washer | 34 Rear Sight Protector Screw | 58 Stock Bolt |
| 13 Locking Bolt | 35 Rear Sight Protector | 59 Stock Bolt Washer |
| 14 Safety Catch | 36 Rear Sight Assembly with Base | 60 Buttplate Screw |
| 15 Ejector | 37 Inner Band | 61 Trapdoor Buttplate |
| 16 Rear Trigger Guard Screw | 38 Inner Band Spring | 62 Trapdoor Spring Screw |
| 17 Stock Bolt Plate | 39 Inner Band Screw | 63 Trapdoor Spring |
| 18 Magazine Catch | 40 Front Sight Blade | 64 Buttplate |
| 19 Bolt Head Retaining Spring | 41 Front Sight Base | 65 Buttstock |
| 20 Magazine Catch Pin | 42 Front Sight Pin | 66 Forestock |
| 21 Retaining Spring Screw | 43 Front Nosecap Screw | 67 Roper Hand Guard |
| 22 Sear Spring | 44 Nosecap | 68 Front Hand Guard |
| | 45 Nosecap Nut | 69 Barrel |
| | 46 Rear Nosecap Screw | 70 Magazine |

640,000 Lee-Enfields. Over 1,000,000 No. 4 rifles, including about 1000 sniper rifles, were made in the Long Branch arsenal in Canada. More than a million of the No. 4s were also made by Savage in the United States. This accounts for around 6,000,000 rifles, but that's only part of the total production. I have no additional production figures, nor serial number records, so I can't even guess how many were made in all. Nor do I have any figures on how many were imported into the U.S. as surplus arms after WWII, but it probably runs into hundreds of thousands. At least there are enough of them in the United States and the rest of the world to last a long time.

Headspace and Chamber Tolerances

To cut down manufacturing and assembly time, perhaps, and certainly to reduce maintenance time later on when headspace corrections were needed, a new headspacing system was introduced with the No. 4 rifles. It was a simple system, made possible by the two-piece bolt with separate bolt head. It consisted of making the bolt heads of different lengths to obtain and maintain proper headspace; in the 303 Lee-Enfield rifle, this is the space between the face of the bolt head and the barrel face.

The bolt heads, made in four different lengths, were numbered from "0" to "3." No. 0 head was the shortest; No. 1 was .003" longer than No. 0; No. 2 was .003" longer than the No. 1; and the No. 3 was .003" longer than the No. 2 head. During factory assembly, a bolt head was fitted which gave normal headspace of .064" to .074". These figures represent minimum and maximum allowable headspace. If, after much use, headspace increased, a new bolt head could be installed to decrease headspace by .003", .006", etc. Bolt heads of the No. 4 rifles were marked with the qualifying number on the extractor lug.

To the consternation of many handloaders, No. 4 rifles were often found to have overly large chambers—that is, longer than need be to accept commercial 303 British cartridges. These wartime chambers were purposely made large so that the rifles would function properly even with dirty, corroded or slightly damaged ammunition. While most Lee-Enfield military rifles have "maximum" chambers, most No. 4 rifles (as well as the No. 5 carbines) seem to have chambers much larger than the normal maximum, so large that the fired cases show pronounced body enlargement, with body splits not uncommon. Manufacturing tolerances for both rifles and ammunition were generous during the war, which in no way affected the rifle for military use, or even for sporting use. A large chamber, however, is not desirable in a target rifle, so it was a problem for many handloaders, since their cases seldom lasted more than two or three reloadings before they'd separate.

Case separation is generally caused by overworking the brass, by repeated full-length resizing. Shooters often blame excessive headspace for case separation (and it may be partly to blame in some rifles), but even in a rifle with minimum or zero headspace, too-frequent full length resizing is the real cause of case separation. The Lee-Enfield reloader should A) Get a full length sizing die tailored to his rifle's chamber; RCBS can supply these if several fired cases are sent to them. B) Resize the case just enough to let it enter the chamber with a touch of effort. C) Neck size only, assuming that cases so-worked will enter the chamber without undue force. Other than this, the only positive solution is to set the barrel back and rechamber it, or install a new barrel with a normal chamber.

Sunsmithing the Lee-Enfield

Both No. 1 and No. 4 rifles can be remodeled into fine sporting rifles for hunting big game. For most big game hunting, in my

opinion, few cartridges are better than the 303 British. Underneath the wood handguard is a slim tapered barrel of the most pleasing contour, ideal in weight for a sporter. The action is reliable, strong and easy to operate—smoother, too, than many other military turn-bolt actions. The action has a good safety and a low, well-positioned bolt handle. Shortening the barrel, installing the sights of your choice, remodeling the issue stock, or installing a new sporter stock and forend, is about all that is needed to turn these rifles into sporters. Other things can be done to make the Lee-Enfield into a deluxe sporter, but whether you want a plain or deluxe job, the "makings" are there.

I don't think, though, that it's practical to spend a lot of time and money to build a deluxe Lee-Enfield sporter for several reasons. First, it is much easier to remake the rifle or carbine into an open-sighted rough-and-ready, spare, second or loan-out rifle. The No. 5 Carbine, usually called the "Jungle Carbine," is such a rifle as is. It is perhaps the best choice of any military rifle to use pretty much as issued for hunting. The buttstock is rather short for many shooters, and the comb is very low, but putting on a low-cost Fajen or Bishop buttstock will correct these problems—and all you need is a large and long screwdriver to install it. A new forend is as easy to install, but the issue forend on the No. 5 is acceptable the way it is.

Because it has a longer barrel, the No. 1 rifle makes a better looking sporter. I suggest shortening the barrel to 22 or 24 inches, then installing such open sights as the Williams Guide rear sight, and a bead or blade front sight mounted on the Williams sweat-on or screw-on ramp base. If you'd rather have a receiver sight, I'd recommend the Williams Footproof sight. For the No. 4 Lee-Enfield, I suggest the Redfield adaptor bracket and their receiver sight, since no drilling and tapping is required.

After the barrel has been shortened and the



No. 4 Mark I Lee-Enfield action, open.



Top view of the No. 4 Mark I action.

sights installed, the No. 1 or No. 4 sporter can be completed by installing a new sporter stock and forend. They are furnished by several stock firms. To improve the looks of the rifle, the metal can be polished bright and then reblued. A lot of these rifles have Parkerized metal. If you like this matt surface, but dislike the color, the parts can be reblued without doing any polishing. To remove the Parkerized finish, it will have to be polished off. Some No. 4 rifles have a dark, painted-on finish, which can be removed with coarse emery cloth in the first step in making the metal smooth.

It is not too difficult to alter the ten-shot magazine to five-shot. Cut off the bottom part of the magazine, which projects below the stock, and weld or silver solder on a new bottom plate made from a piece of heavy sheet metal.

To make the receiver a bit trimmer, the clip changer guide bridge can be cut off entirely. This will not weaken the action to any noticeable extent. The magazine cutoff on the No. 1 actions should be discarded.

Lee-Enfields are not ideally suited for use with a scope sight. However, a hunting scope can be mounted on No. 4 and No. 5 rifles with one of the several commercial scope mounts available.

I have often been asked about the feasibility of restocking the Lee-Enfield with a one-piece stock. A couple of my friends stocked their Lee-Enfields in this manner, but after I saw the work involved, my advice is—don't attempt it!

Rechambering and Rebarreling

Lee-Enfield rifles offer no rechambering possibilities. There is the 303 British Improved cartridge, a blown-out, sharp-shouldered version of the standard 303, but rechambering the Lee-Enfield for it is not advisable. (The 303 British P-14 Enfield rifle, which has a stronger action than the Lee-Enfield, however, is suitable for this rechambering.)

I continually get letters from shooters who would like to build a 45-70 or some other big bore caliber bolt-action rifle, many of them wanting to know if the Lee-Enfield action would serve their purpose. Well, the foreman of the Lee-Enfield, the Remington-Lee rifle, was made in 45-70, and the No. 1 and

No. 4 Lee-Enfield actions, with some alterations, could be adapted and rebarreled to handle this cartridge. With similar modifications, the No. 4 action would also be suitable for the 444 Marlin cartridge. Whether this rebarreling would be practical or not is something else, much depending on how much of the work you can do yourself.

I strongly advise against using any Lee-Enfield action for rebarreling to any one of the wildcat cartridges based on the 303 British or 30-40 Krag case.

The Lee-Enfield for Target Work

In England, Canada and Australia, the Lee-Enfield has long been used for competitive target shooting, a sport for which these rifles have been highly developed. Parker-Hale, Ltd., was one source of a line of target accessories for this rifle, including the best precision-made receiver sights. Because the 7.62mm NATO (308) was the standard military cartridge of these countries, and because the supply of good 303 British target ammunition was no longer plentiful, many target shooters converted the No. 4 rifles to the 7.62mm. At least one firm in England once offered a conversion kit, which includes a threaded and chambered 7.62mm barrel, magazine, extractor, ejector and clip-slot adaptor. In fact, if the rifle was used as a single shot, only a barrel is needed, and any component barrelsmith could do the job. Only the No. 4 (or No. 5) action is suitable for 7.62mm rebarreling, since it is the strongest of the Lee-Enfields.

Comments

During the many years that rifle mechanics have interested me, I've read and heard much praise and criticism of the Lee-Enfield action and rifle, with devotees and critics equally vehement. While I don't want to enter into this debate, I will make some comments.

Although the Lee turnbolt-action system was of advanced design when James Paris Lee patented it in 1879, and when a modified version of it was adopted by Great Britain in 1888, it must be conceded that it was, along with the rimmed 303 British cartridge, outmoded by the Mauser system actions devel-

oped from 1893 to 1898. Regardless of this, the British, having made the choice, probably spent more time and money in experimenting and testing the Lee-Enfield rifle than any other country did. The fact that the Lee-Enfield rifle performed so well during its long military history proves without a doubt that the action is sound. Manufacturing specifications were quite rigid. The steel used in it was always the best available for the purpose. The various parts were properly machined, finished and heat-treated. Unlike the early Model 1903 Springfield actions, there was never any doubt about the quality of the steel and heat-treatment used in making the Lee-Enfield action. Generally, however, it is not material or manufacture that is criticized, but the design.

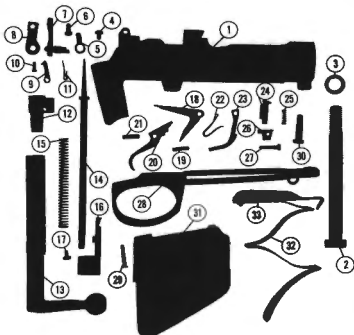
The two-piece stock design is often criticized, yet I think no other military bolt-action rifle has a stronger buttstock attachment to the receiver. It is, perhaps, stronger than the Japanese Arisaka Type 99 rifle. The separate Lee-Enfield forend, though, has always given trouble, I believe, however, that if the butt socket had been designed with a front recess, so the rear of the forend could have been fitted inside it, and the barrel had been made a bit shorter and heavier from the start, bedding problems would have largely eliminated.

The protruding sheet-metal magazine is also criticized. The British did not develop the Lee-Enfield for anything except military use, and I believe its magazine system is one of the best for military use. The magazine box was made rather light, but it was quickly detachable, and if it was damaged another one could be quickly inserted. For some military uses, it probably was more convenient to carry extra loaded magazines than loose ammunition or ammunition in clips. Even though the magazine was detachable, for most military use it was left in place and loaded from the top through the action, either with clips or by pressing single cartridges into it. The large capacity was certainly desirable, and the fact that the magazine protruded below the bottom of the stock was of no disadvantage for military use since the point of balance of these rifles is forward of the magazine.

The Lee-Enfield action has more than

Parts Legend No. 4 Mark I

- 1 Receiver
- 2 Stock bolt
- 3 Stock bolt washer
- 4 Ejector
- 5 Bolt lock
- 6 Safety spring screw
- 7 Safety
- 8 Safety spring
- 9 Extractor
- 10 Extractor screw
- 11 Extractor spring
- 12 Bolt head
- 13 Bolt
- 14 Firing pin
- 15 Mainspring
- 16 Cocking piece
- 17 Firing pin lock screw
- 18 Sear
- 19 Sear pin
- 20 Trigger
- 21 Trigger pin
- 22 Sear/magazine latch spring
- 23 Magazine latch
- 24 Bolt head release
- 25 Bolt head release spring
- 26 Bolt head release stop
- 27 Magazine latch screw
- 28 Trigger guard
- 29 Rear guard screw
- 30 Front guard screw
- 31 Magazine box
- 32 Follower spring
- 33 Follower



Dimensional Action Specifications

Weight	
No. 1	49 oz.
No. 4	52 oz.
Overall length	7.50"
Receiver ring dia.	
No. 1	1.270"
No. 4	1.305"
Bolt body dia.	.580"
Bolt travel	3.575"
Striker travel	.775"
Bolt face (no recess)	Flat

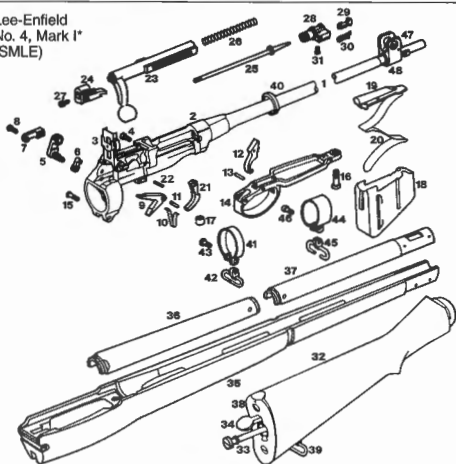
General Specifications

Type	Tumbolt repeater.
Receiver	One-piece machined steel forging with slotted main bridge. The forward part of the main bridge is built over to form a narrow bridge for the clip-charger guide.
Bolt	Two-piece, with separate non-rotating bolt head. Dual-opposed locking lugs on the rear of the bolt.
Ignition	One-piece firing pin powered by a coil mainspring. Cocks on closing bolt.
Magazine	Detachable, staggered-column, ten-round box.
Trigger	Non-adjustable double-stage military-type pull.
Safety	Lever type at left rear of receiver, locks striker and bolt when swung back. Striker can also be placed in "half-cock" or "safe" position manually; see text.
Extractor	Non-rotating hook type positioned in bolt head; separate spring.
Magazine cutoff	Cutoff provided on No. 1 Mark III, none on No. 4 or 5.
Bolt-stop	No separate bolt-stop; extractor housing on bolt head acts as bolt-stop. See text.
Ejector	Stud screw threaded into left receiver wall.
Stock fastening	Buttstock attached to receiver by a through-bolt.

(Below) All Lee-Enfield bolts have separate bolt heads, the bolt head threading into the bolt body. Shown here is a No. 4 bolt head, unscrewed from the bolt body.



Lee-Enfield
No. 4, Mark I*
(SMLE)



Parts Legend

- 1 Barrel
- 2 Receiver
- 3 Rear Sight
- 4 Ejector Screw
- 5 Safety Bolt
- 6 Safety Catch
- 7 Safety Bolt Spring
- 8 Safety Bolt Spring Screw
- 9 Sear
- 10 Sear Spring
- 11 Sear Pin
- 12 Trigger
- 13 Trigger Pin
- 14 Trigger Guard
- 15 Rear Guard Screw
- 16 Front Guard Screw
- 17 Front Guard Screw Bushing
- 18 Magazine, Complete
- 19 Follower

- 20 Follower Spring
- 21 Magazine Catch
- 22 Magazine Catch Pin
- 23 Bolt
- 24 Cocking Piece
- 25 Firing Pin
- 26 Firing Pin Spring
- 27 Firing Pin Stop Screw
- 28 Bolt Head
- 29 Extractor
- 30 Extractor Spring
- 31 Extractor Screw
- 32 Buttstock
- 33 Stock Bolt
- 34 Stock Bolt Washer
- 35 Forestock
- 36 Rear Hand Guard
- 37 Front Hand Guard
- 38 Buttplate
- 39 Butt Sling Swivel Assembly
- 40 Rear Stock Band

- 41 Middle Stock Band
- 42 Front Sling Swivel
- 43 Front Sling Swivel Screw
- 44 Front Stock Band
- 45 Stacking Swivel
- 46 Stacking Swivel Screw
- 47 Front Sight Guard
- 48 Front Sight Base and Guard Screw

Parts Not Shown

- Bolt Head Release
- Bolt Head Release Spring
- Bolt Head Release Stop
- Bolt Head Release Stop Screw
- Front Sight Base
- Front Sight Blade
- Rear Sight Base Pin
- Rear Sight Plunger
- Rear Sight Plunger Spring
- Stripper Clips

ample strength for the 303 British cartridge. The two rear locking lugs are not only more than adequate to secure the bolt in the receiver, but keep the necessary bolt travel to a minimum. The threaded-in detachable bolt head is a good feature; it provided a good bolt-stop and a very convenient means to control headspace, as was done in the No. 4 rifles. The safety and trigger mechanisms are rugged and reliable. The extractor is good, but I believe it would have been a better design with a coil spring rather than a flat one, since the extractor spring is about the only part subject to breakage. There was no need for the half-cock feature. Nevertheless, Reynolds (*op cit.*) says that demands from field units brought the half-cock feature back; that its lack was considered dangerous. The action cocks on closing the bolt and is not liked by many shooters, but it's really not a drawback once a person gets used to its proper operation. This goes for the double-stage trigger pull as well.

The 303 British Cartridge

Like the Lee-Enfield rifles, the 303 British cartridge proved an excellent military round. The original military loading was with a 215-



The No. 4 (left) and No. 1 Mark III (right) Lee-Enfield bolt heads.

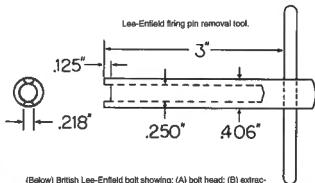
grain bullet. The standard 303 British ball loading from 1910 used a 174-grain pointed full-jacketed bullet at a muzzle velocity of 2440 fps.

Not long after its adoption in 1888, the 303 cartridge became a very popular sporting round. It was used throughout the British Empire on all kinds of game—tigers in India, small antelope to elephants in Africa, crocodiles to water buffalo in Australia, and deer to moose in Canada. Much of this shooting was

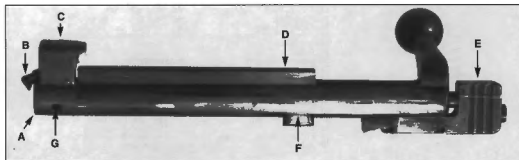
done with the regular unmodified Lee-Enfield military rifle, but many double-barreled rifles chambered for it were the choice of more affluent sportsmen. Winchester chambered their Model 95 lever-action rifle for the 303 British cartridge, making the rifle popular in Canada.

For the most part, the only 303 British sporting loads available for many years were the 215-grain softpoint for use on thin-skinned animals and the 215-grain full-metal-cased bullet for thick-skinned game. American, Canadian, European, African and Australian shooters can readily purchase 303-caliber British sporting ammunition. The two most common loads will be with the 150-grain and the 180-grain bullets. The 303 British cartridge is in the same power class as the 30-40 Krag and 300 Savage. It should not be confused with the smaller 303 Savage cartridge, nor is the 303 British interchangeable with any other cartridge, although its case is nearly the same as the 30-40.

The 303 British cartridge is reloadable. It uses standard 303 (.311"-.312" diameter) bullets. Lee-Enfield barrels have a left-hand rifling twist of one turn in 10 inches; bore (land) diameter is .303", groove diameter about .314". Most barrels have 5 grooves, although some late-manufactured No. 4 rifles may have 2-groove barrels. The No. 4 rifles made by Savage usually have 6-groove barrels.



(Below) British Lee-Enfield bolt showing: (A) bolt head; (B) extractor; (C) bolt head lug which houses the extractor and extractor spring; (D) bolt guide rib/locking lug; (E) cocking piece; (F) left locking lug and (G) gas vent hole in the bolt head.





Mauser Miscellany

Erma 22 Rimfire Conversion Unit

LUGER FANS HAVE long been familiar with the Erma 22 rimfire conversion unit made for that pistol. Not so well known, however, is the 22 Long Rifle conversion unit this firm (Erma Werke in Germany) made for the M98 rifle. I believe this unit was made in the 1920s and '30s, but I don't think it has been made since before WWII. The conversion unit illustrated here is unmarked (except for serial numbers and proof marks), but I believe, and several other Mauser fans agree with me, that this is the Erma unit.

This, or a similar conversion unit, was also used by the military in Germany for training purposes. It was called the "Model 24 Insert Barrel." It was most likely first made as a single shot, then as a repeater later on. These were probably by Erma.

This conversion unit has the basic mechanical components of a rifle—a complete action and barrel assembly but minus sights, trigger and stock. The action is a turn-bolt, the cartridges fed into it from a detachable box magazine. Only the bolt and floorplate/follower assemblies must be removed from the M98 rifle for the unit to be installed. It was made primarily to be used in any 8mm M98 military rifle or carbine having a barrel at least 24" long, but it can also be used in 8mm Mauser sporting rifles with similar length barrels.

The receiver of this unit fits in the receiver of the M98 in place of the regular bolt. The main length of the barrel is only slightly smaller than the land diameter of the 8mm barrel, so it fits snugly in the bore. The breech end of the barrel is the size and shape of the chamber. On the breech end there is a collar and, between this collar and the receiver, there is a two-piece threaded adjustable sleeve arrangement. One part of this sleeve has two lugs which can be rotated

to engage in the locking lug recess in the M98 receiver. When the unit is inserted into the M98, the outer sleeve with its lugs is turned clockwise to engage the lugs in the receiver, then the inner sleeve is turned clockwise to secure the unit in the rifle. Holes are provided in both outer and inner sleeves so that they can be turned with a tool, such as a nail with its point filed off.

The front part of the unit's receiver has two openings; one at the bottom for the magazine, one on the top right for the ejection port. The rear part of the receiver, larger than the main part, is made to fit in the larger opening in the M98 receiver and over the top of the tang. This prevents the entire unit from turning in the receiver. The barrel is attached to the receiver with two cross pins.

The bolt has three main parts; the two-diameter bolt body, which contains the long extractor and separate firing pin; the bolt handle sleeve, which threads into the rear end of the bolt body, and the firing mechanism composed of striker, mainspring, cocking piece, safety and striker nut. A slot is milled in the thick rear part of the receiver for the bolt handle, and a notch cut in this slot for the base of the bolt handle to lock the bolt in the receiver when the bolt is closed. The bolt stop is merely a shoulder in the rear zig-zag slot for the bolt handle.

The cocking piece has a projection which extends through a narrow slot in the bottom of the receiver and into the cocking cam raceway in the M98 receiver to engage the sear. The striker is cocked entirely on the closing motion of the bolt. When the action is cocked, the wing safety can be rotated down to engage over the end of the receiver.

The detachable five-shot box magazine is well made. The milled follower is guided inside the magazine by its rounded front end moving in a cylindrical guideway built into

the front of the magazine. The coil magazine spring is positioned in this cylinder. The magazine is precisely and securely held in position through a hole in the floorplate, inside of which is attached a sheet metal guide housing. A notched flat spring attached to the right side of the magazine holds the magazine up when the notch engages over the edge of the floorplate. The bottom of the magazine and its release spring project below the magazine floorplate so that it can be easily grasped and removed.

The unit illustrated here is very well made, fitted and finished, and all the major parts are numbered.

To install the unit in an M98 rifle, remove the bolt assembly, floorplate, follower and follower spring. Turn the locking sleeve on the Erma unit so the hole in the rear part of this sleeve is up, then insert the unit into the receiver and barrel as far as it will go. Pull the trigger or open the bolt of the unit so it will stay forward. Now rotate the locking sleeve 1/2-turn clockwise until the locking sleeve can be turned. When the locking sleeve is engaged, turn the adjustment sleeve clockwise until tight. Install the floorplate, slip in the magazine and the rifle is ready to fire.

I fired the conversion unit shown here at an indoor 50-foot range, using standard velocity 22 Long Rifle ammunition. Taking a fine bead over the crude military sights on the M98a carbine in which this unit was fitted, and with the rear sight elevated to the 600 meter setting, the shots zeroed perfectly in the target. Considering the crude sights, accuracy was quite good, suitable for plinking and

(Above) The Model 98 Mauser 22 rimfire conversion unit installed in a WWI M98a carbine.



Close-up of the conversion unit, shown with bolt open.

Dimensional Specifications

Overall	.....31.875"
Barrel	.....26.25"
Action	.....6.5"
Weight	.....25 oz.
Rifling	......5 narrow lands, RH twist, 1 in 17"
Groove dia.	......222"
Caliber	......22 LR rimfire
Magazine capacity	.....5

The complete 22 conversion unit for the M98 rifle in 8mm (6x57 or 7.9x57) caliber. Unit is shown with bolt open. The Erma units were usually supplied in a partitioned wood box with an extra magazine and instruction sheet.

small game at close range. The unit functioned perfectly and there were no feeding, ignition or extraction problems.

These Erma conversion units are seldom seen today, but they're an interesting extra for any Mauser rifle collection.

Mauser M98 Breech Cover

One of the rarest accessories ever made for the M98 military rifle was a breech cover. During the early part WWI, the Germans discovered that their M98 was not as fool-proof as it could have been. The main fault showed up when the rifle was used in all sorts of battle and weather conditions—in mud-filled trenches, on dusty, sand-swept battle grounds, or in freezing rain. Then it could become inoperative, or its operation affected, by the entry of foreign material into the action.

Among the several openings in the M98 where foreign material could easily enter, the largest is the thumb notch in the receiver wall, which exposes the left locking lug raceway. This opening is large enough, front and rear, to allow foreign matter to enter the locking lug recess in the front of the receiver and even go inside the bolt, through the two large gas escape holes, and rearward into the bolt-stop and ejector openings. Other openings, especially during rain and freezing weather, are the clip guide slot in the bridge, the space between the bolt sleeve and bridge which exposes both ends of the bolt guide groove, and the space between the extractor and bolt. The problem was evidently considered serious enough to warrant development and manufacture of a breech cover to shield these openings.

Unlike the Type 38 and 99 Arisaka military rifles, whose actions were initially designed for a sliding cover, the M98 action was not so designed, and a cover had to be made to fit it. This was accomplished, as shown in the illustrations. The cover was so constructed that it could be easily attached to the unaltered Gew-98 rifle with the straight bolt handle.

Although it was a sort of make-shift affair, the cover did effectively shroud the greater part of the action.

This breech cover consists of two main parts: the cover and the clip by which the assembly is attached to the rifle. These two parts are attached to each other by a telescoping hinge joint, so the cover will open and close with the bolt.

The clip is made from a piece of wide spring-tempered steel. The top of this clip encircles the exposed top part of the breech end of the barrel, between the rear sight and barrel shoulder, then extends over the left and underside of the forend. It is made with enough spring tension so it is not easily unsnapped from the rifle, once it has been pressed into place.

The cover, which is also made of spring-tempered sheet steel, is accurately formed to enclose most of the top of the action. It extends from the rear of the receiver ring to just forward of the safety, and is wide enough to cover the top of the receiver ring and run over the edge of the stock. It's wider at the rear to cover the entire bolt stop, bridge, the flared part of the bolt sleeve and the root of the bolt handle. The rear end of the cover is turned inward and cut out to conform to and contact the contoured surface of the bolt sleeve. The rear right side of the cover is notched to fit over the bolt handle, and a simple spring bar latch, fastened at the edge of the cover over the notch, loosely fastens the cover to the bolt handle.

The critical part of the breech cover assembly is the telescopic hinge on the left side. The outer part of this hinge is a steel tube securely fastened to the left of the clip. This tube extends about halfway back on the cover. A long thin spring rod, rolled into the rear left

bottom edge of the cover, extends forward into the tube to complete the telescopic hinge, allowing the cover to open and close and slide backward and forward as the bolt is operated.

When the breech cover is in place, and the action closed, it effectively encloses the main part of the action, protecting it against the entrance of foreign material. The cover in no way interferes with the normal operation of the safety, and when the action is open it does not obstruct loading the magazine in any way. On opening the action, however, the cover rises on the bolt handle stem and this makes it necessary for the shooter to grasp only the ball of the bolt when the action is operated.

The breech cover is readily removed by first releasing the bar latch under the bolt handle stem, swinging open the cover and drawing it to the rear to separate it from the clip. The clip can then be removed by pressing the underside of the clip to the left, until it separates from the forend.

Apparently the breech covers were not widely used since they are scarce today. Perhaps they were not developed and made early enough to be used before WWI ended, or maybe the cover wasn't entirely successful.



M96 breech cover in place on the rifle, showing the bolt handle and breech cover raised with action open.



Mauser Model 98

THROUGH STUDY OF other rifle actions and his own development work, Paul Mauser gained considerable insight into precisely what features were necessary and desirable in a military rifle. He knew that each of his succeeding designs was better than the preceding one, so he probably felt that the Model 96 action was still short of perfection. It's interesting that there was a lapse of two years between the introduction of the M96 Swedish Mauser and the advent of the M98, while most other successful Mauser designs were only a year apart.

There was indeed a great advance from the basic M71 blackpowder action to the next important change, the smokeless powder cartridge M98 action. The latter introduced dual-opposed forward locking lugs and the one-piece bolt drilled from the rear. The next major and important design changes were in the M92 action, which introduced the non-rotating extractor, and in the M93 with its flush staggered-column, nondetachable box magazine. All of this design activity by Mauser on his bolt-action system culminated in the design and the perfection of the inside collar in the receiver ring, the third, or safety lug on the bolt, and the improved firing mechanism of the M98.

This achievement was crowned when Germany, his native country, adopted the Model 98 Mauser rifle. Although Mauser continued to invent other arms, some of which were outstanding, it is the M98 action for which he is best known. Paul Mauser died in May, 1914, just at the start of WWI, a conflict that would see his M98 pitted against a variety of inferior rifles.

The Action

The one-piece receiver is machined from a steel forging. The recoil lug, an integral part of the receiver, is located about 1.43" behind the front edge of the receiver. It is about 1.1" wide and .25" in depth, ample in area to secure the action in a reasonably hard, wood stock if properly bedded and tightened in place. Behind the recoil lug the bottom of the receiver is flat, including the tang.

The receiver ring is threaded inside to accept the barrel shank. The threads are of

common V-type, but with a 55-degree angle rather than the standard American 60-degree angle. The barrel breech is flat, with the chamber edge slightly rounded. Inside the receiver ring there is a collar against which the breech end of the barrel abuts. This collar extends entirely around the inside of the receiver ring except for an extractor cut. It forms a ring that closely surrounds the bolt head when the bolt is closed. The rear of this collar, beveled toward the chamber, forms a wide funnel which sometimes helps to guide the cartridges into the chamber.

This collar strengthens the receiver ring and, except for the extractor cut, provides a good seal around the bolt head. Normally, the barrel shank is made to butt tightly against this collar so that the shoulder of the barrel need not nor should contact the front edge of the receiver.

The magazine well of the M98 action is milled from the bottom of the receiver, between the bridge and ring, leaving lips at either side of the upper edge to hold the cartridges in place. The front of the well is milled to form a shallow "U" ramp to guide the cartridges into the chamber. The right side of the receiver opening is cut very low, leaving little more than the side rail of the magazine well. The left side of the receiver opening has a wall extending about two-thirds of the way up the receiver ring which is milled for the left locking lug raceway. However, the rear of this left wall, close to the bridge, is cut as low as the right side to form a thumb recess to aid loading the magazine from a charger clip. The only really weak point in the action results from this notch—more on this later.

The top front of the bridge is slotted for the charger clip. The top of the bridge behind the charger clip slot is milled thinner to remove excess metal. The rear of the receiver ends in a tang, grooved to accept the cocking piece cam.

The bolt is a solid steel machined forging, with an integral bolt handle. Dual-opposed locking lugs are on the front end. The right (bottom) lug is solid. The left (top) is slotted to allow the ejector to pass through. The bridge and the left receiver wall are milled inside to pass the bolt and lugs. The receiver

ring is milled inside to form supporting shoulders for the locking lugs to engage when the bolt is closed. These lugs hold the bolt securely against the barrel breech.

A recess in the bolt face leaves a shallow rim about two-thirds of the way around the bolt head, partially supporting the cartridge head. The left side of this rim (opposite the extractor), through which the ejector slot passes, is made higher and undercut so the extractor pressure will securely hold the cartridge, or the fired case, while the bolt is being opened. This prevents the case from dropping down and supports it until the ejector slips it out.

The long spring-steel extractor is attached to the bolt by a collar which fits a groove cut into the bolt body. A lip under the extractor, behind the extractor hook, engages a narrow groove in the bolt head in front of the locking lugs, preventing longitudinal movement of the extractor on the bolt. The front of the extractor lip, and the groove into which it fits, is slightly undercut to prevent the extractor hook from moving outward or from slipping over a cartridge rim when force is required to extract a tight cartridge or case from the chamber.

The M98 bolt has a third or safety lug located at the rear of the bolt slightly forward of the bolt handle, and in line with the right locking lug. A recess is milled in the receiver below the bridge in which the lug moves when the bolt is closed. The recess is milled with enough tolerance so the lug will not contact the receiver—it is not intended to help hold the bolt in the locked position but acts only as a safety lug in the event the front locking lugs or receiver ring should fail. The bolt, at top, has a center guide rib about 2.2" long and .235" wide. When the bolt is closed, this rib rotates under the rear part of the extractor. The underside of the bridge is grooved to allow passage of the rib.

The top forward corner of the square base of the bolt handle is slightly beveled, the rear surface of the receiver bridge inclined to the rear. On opening, the bolt is cammed rear-

(Above) Original M98 Mauser rifle.



Standard M98 military action.

ward by the bolt handle base which moves along this inclined surface. This movement provides the initial extraction camming power. This inclined surface also aids in starting rotation of the bolt when it is closed. In addition, inclines on the approaches of the locking shoulders in the locking lug recess in the receiver ring, along with a slightly beveled corner on each locking lug, provide the power to force the bolt forward the last $\frac{1}{32}$ -inch as the bolt is rotated 90 degrees to lock it. The bolt handle shank usually has a slight taper and ends in a round grasping ball. On most early military Mauser rifles the bolt handle shank is straight, at a right angle to the long axis of the action. On most short rifles and carbines, the bolt handle shank is bent down to place the ball nearer to the stock.

The rear of the bolt body behind the bolt handle (about .60") is made larger (.78") than the main body of the bolt (.70"). This provides

extra metal for the firing and safety mechanism. The bolt is bored from the rear to accept the firing pin and mainspring, and has buttress threads to hold the bolt sleeve. The rear half of the firing pin is flat on two sides and extends through a matching hole in the bolt sleeve. The rear of the firing pin and cocking piece are machined with three evenly-spaced interrupted lugs to afford a solid and precise quarter-turn fastening between these parts. The coil mainspring is compressed between the bolt sleeve and the flange on the firing pin, and is retained by the cocking piece.

Most M98-type actions made after 1901 were made with a safety firing pin. These firing pins have two lugs forward of the mainspring flange matching similar depressions forged inside the bolt. The purpose of this feature is to block the fall of the firing pin should it break before the bolt is fully locked. For example, if the firing pin broke while closing

the bolt on feeding a live cartridge into the chamber, it could not strike the primer because the firing pin safety lugs would strike the shoulders within the bolt and block its fall.

The cocking piece cam fits into the rear of the bolt sleeve. The cam extends down into the tang groove and forward into a deep notch cut into the thick rear end of the bolt. This notch is inclined to one side so that on raising the bolt handle the cocking piece and the firing pin are forced back about .350"—enough so the sear drops in front of the cocking piece sear surface. Then, on the final closing motion, the bolt moves forward while the sear holds the cocking piece back, cocking the action fully. Although the M98 action is normally referred to as a "cock-on-opening" action, about one-third of the cocking motion is accomplished as the bolt is closed.

The bolt-sleeve lock fits into a hole in the left side of the bolt sleeve. It is given forward tension by a coil spring and is positioned by a small



Left side view of the M98 Mauser action.



A "short" M98 military action having an overall length of 8.50" and a magazine opening of 3.225" (action shown fitted with a new bolt handle).

stud on the body of the lock within a groove in the bolt sleeve. As the bolt is turned to unlock it, the safety notch cut in the rear of the bolt is rotated in line with the bolt-sleeve lock, allowing them to engage. This securely locks the bolt sleeve and prevents it from turning on the bolt until it is locked again, when the bolt is closed and the bolt-sleeve lock is pushed back into the bolt sleeve by the rear edge of the bridge.

The wing safety is positioned in a hole, lengthwise, in the top of the bolt sleeve. The wing part of the safety is notched and fits over a collar on the bolt sleeve, which prevents the safety from falling out. This collar is notched on its far right side to permit the safety to be removed from the bolt sleeve, but only when the cocking piece is removed first. With the action assembled, and the safety swung to the right, the mainspring tension on the cocking piece holds the safety in place. The stem of the safety extends forward through the front of the bolt sleeve to intersect the rear of the bolt body. The end of this stem is notched and engages in the notch in the bolt only when the safety is swung to the far right or "safe" position. In this position both the striker (firing pin and cocking piece) and the bolt are locked.

Swung to the left or "off" position, the safety is disengaged. Swung upright, in its intermediate position, only the striker is locked back, allowing the bolt to be operated to safely unload the magazine by running the cartridges through the chamber. When the safety is swung from the left to the upright position or beyond, it engages behind the cocking piece and draws it back clear of the sear. When it is released, the sear will be in position in front of the cocking piece, holding it cocked.

The bolt has two large oblong vents through which powder gases can escape in the event of a pierced primer or ruptured case head. These

two holes are located in the front part of the bolt, one on either side of the extractor collar and near the small part of the firing pin. When the action is closed these vents align with the left locking lug raceway, thus directing any escaping gases backward. Much of the escaping gases would exit at the thumb slot. If any gases pass into the bridge raceway the bolt would block much of it, while the wide, bolt sleeve flange effectively deflects the remainder away from the shooter's face. This flange is as wide as the rear part of the receiver.

The bolt-stop, positioned at the left rear of the receiver, is held in place by, and pivots on, a pointed screw which passes through the bolt-stop and a slotted square stud integral with the receiver. A projection on the bolt-stop projects through a hole in the receiver bridge, placing it in the path of the left locking lug. This halts the rearward motion of the bolt when it is drawn back. A flat ejector is held inside the bolt-stop and pivots on the bolt-stop screw. The ejector protrudes through a slot in the receiver. A two-leaf spring, mortised into the bolt-stop provides tension to the bolt-stop to hold it against the receiver, and to keep the ejector riding against the bolt so it will be in position to eject the cartridge or case.

The sear is hinged via a pin and a stud under the rear of the receiver. A coil spring, recessed at the front of the sear, tensions the sear and trigger. The trigger is hinged to the sear by a pin. The top of the trigger is made with two bumps to provide the two-stage trigger pull.

The trigger guard and the magazine box are machined from a single piece of steel. Although the trigger guard is combined with the magazine box, it is usually called the trigger guard—or simply the guard. The guard bow is quite heavy and the same width as the guard tang above it. The magazine box, open at the bottom, is closed

by a milled detachable floorplate. The floorplate is held in place by lips at either end fitting grooves cut into the guard and retained by a spring-loaded plunger at the rear of the magazine box, and engaging in a hole in the stud on the rear of the plate. Depressing the plunger through the hole in the rear of the floorplate allows it to be moved to the rear and released.

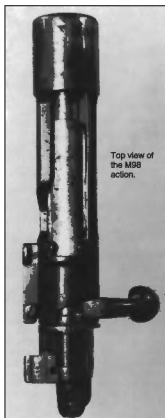
The magazine follower is made with a rib on its upper left side, forcing the cartridges to form a staggered column in the magazine. The rear end of the follower rib is square. When the magazine is empty and the bolt is opened, the follower rises into the path of the bolt and prevents it from being closed. This informs the shooter that the magazine is empty. The ends of the W-shaped flat magazine spring fit shallow mortises cut into the bottom of the follower and inside the floorplate.

Heavy guard screws pass through holes at each end of the trigger guard and thread into the recoil lug and tang of the receiver. A large stud on the front end of the guard, through which the guard screw passes, is recessed to fit over a smaller stud on the bottom of the recoil lug. This stud aligns the receiver and the trigger guard magazine box. A sleeve in the rear guard screw hole of the stock correctly spaces the rear of the guard and receiver.

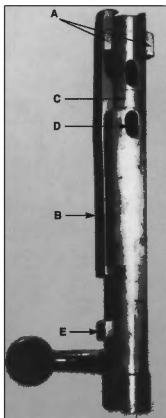
Most M98 military actions use two small screws to lock the guard screws. The heads of the guard screws are notched, and the lock screws are positioned just in front of them to prevent their turning. The lock screws are also notched. If they are turned so the notch aligns with the guard screws, the latter can be turned out without removing the lock screws.

Operation

The action is opened by grasping the bolt handle, rotating it upward 90 degrees and



Top view of the M98 action.



An underside view of the M98 Mauzer bolt shows the dual-opposed locking lugs (A), extractor (B), extractor collar (C), dual oblong vent holes (D), and safety lug (E). This 98a carbine bolt has a bent down handle with the under-side of the grasping bell flattened and checkered.

press the bolt sleeve down; turn the cocking piece one-quarter turn in either direction, and lift it off the firing pin. Firing pin and mainspring can now be separated. Swing the safety to the right and pull it out of the bolt sleeve. Depress the bolt sleeve lock plunger and rotate it counterclockwise until it is released; pull it and the spring from the bolt sleeve. Remove the extractor by lifting the front (hook end) away from the bolt so that it can be turned to the bottom of the bolt; the extractor can now be removed by pushing it forward. Reassemble in reverse order.

To remove the bolt-stop, turn the bolt-stop screw out, and lift it from the receiver. Pull the ejector forward out of the bolt-stop. Place the bolt-stop in a vise and, using a drift punch, drive the spring forward until its end slips down. Now insert a small screwdriver between the end of the spring and bolt sleeve, and pry the spring forward. In reassembling the spring into the bolt-stop, the end of the spring must be raised over the edge of the bolt-stop when it is being driven into place.

To remove the barrel and action from the military stock, first remove the upper and lower barrel bands from the forend, then remove the two guard screws from the bottom of the trigger guard. The barrel, action, and magazine can now be lifted out of the stock.

Remove the floorplate by depressing the floorplate plunger with a pointed tool (or pointed bullet tip) put through the hole in the rear of the plate, then slide the plate to the rear. The magazine follower and its spring will come out with the plate. The three parts can be separated by sliding the plate and follower off the ends of the spring. Remove the floorplate plunger by driving out the crosspin from the rear of the magazine box. Remove the trigger and sear by driving out the trigger and sear pins. Reassemble in reverse order.

Large and Small Ring Actions

Model 98 actions with a receiver ring about 1.410" in diameter are commonly called "large ring" Mausers. Most M98 sporting and military rifles made up to the end of WWII are based on this large ring action. Most of the commercial M98-type actions made after WWII, like the FN, are also of the large ring type.

The "small ring" Mauser actions have a receiver ring diameter of about 1.300". A lot of the early M98 carbines, like the 98a, were based on the small ring action. The most notable later carbine using this action was the lightweight Czech Model 33/40.

pulling back as far as it will go. The striker is partially cocked when the bolt handle is raised. If the cartridges are in a charger clip, insert either end of the clip into the charger guideway of the receiver bridge and, with the fingers under the action and thumb on the topmost cartridge, shove the cartridges down into the magazine. Cartridges can be singly loaded into an empty or partially empty magazine, by laying the cartridge in the open action and pressing it into the magazine with the tip of the thumb. To close the action, grasp the bolt handle and push the bolt forward. As the bolt moves forward it pushes the top cartridge in the magazine into the chamber. The cartridge head slides under the extractor hook on the final forward movement of the bolt.

During the final forward movement of the bolt, and on rotating the bolt clockwise to the locked position, the sear engages the cocking piece to hold it back as the locking lugs pull the bolt fully forward to lock and seat the cartridge in the chamber. The rifle can now be fired by pulling the trigger, releasing the fir-

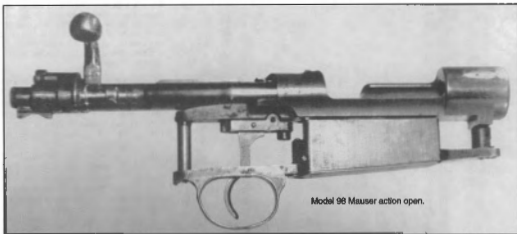
ing pin under mainspring tension, or the action can be made "safe" by swinging the safety to the right. Cartridges can be extracted and ejected safely by swinging the safety to its intermediate or upright position and opening and closing the bolt.

The firing pin can be lowered without snapping it by merely swinging the safety to the left, or fire position, raising the bolt handle, and then holding the trigger back as the bolt is rotated down to its locked position. *This should only be done with an empty chamber.*

Takedown and Assembly

Check the chamber and magazine to be certain the rifle is unloaded. Close the bolt and place the safety in the upright position. Now raise the bolt handle, swing the bolt-stop to the left, and draw the bolt from the receiver.

To disassemble the bolt proceed as follows: Depress the bolt sleeve lock plunger, then unscrew the bolt sleeve and firing mechanism from the bolt; place the firing pin tip on a hard surface and, firmly grasping the bolt sleeve,



Model 98 Mauser action open.

The difference between the large and small ring actions is readily discernible by sight or touch, and there is no need to use a caliber to identify them. On the small ring action the left side of the receiver is straight, including part of the bridge, the wall and ring. However, on the large ring action this surface has a notable jump where the receiver wall merges with the ring, which can be seen and felt.

Because the large ring action has a thicker wall of metal surrounding the sides and top of the barrel shank and locking lug recess areas, it naturally is stronger than the small ring action. Just how much stronger is difficult to say. However, German gunmakers considered the small ring action strong enough for the most powerful 8mm military or sporting cartridge. Generally, the large ring actions are preferred and recommended for use with belted magnum and larger rimless cartridges like the 30-06 and 8mm. The small ring actions are preferred for lightweight sporters using small rimless cartridges like the 7mm and 6mm.

Steel and Heat-Treatment

In our study of Mauser actions preceding the M98, we noted that Paul Mauser made each successive action better, stronger and safer than the preceding model through better design. It is generally agreed by experts that the M98 Mauser obtains its strength from its design rather than by the use of specially formulated or alloyed steels, or by some special heat-treatment. It is not known just exactly what kind of steels were used to make the various parts, or the details of the heat-treatments, but there is no doubt that whatever steels and heat-treatments were used, they were entirely adequate to make the M98 the world's most successful military turnbolt action.

It is believed that the M98 receivers were made of tough quality low-carbon steel. After machining, the only heat-treatment the receiver got was carburizing (case-hardening). This resulted in a hard outside surface to resist wear and rust, but left the core relatively soft for strength.

Receivers of the pre-WWI era, especially the small ring type, tend to be somewhat softer than those manufactured in the 1920s, '30s and early '40s. I have observed that receivers made late in the WWII period, or those dated "44" and "45," are sometimes either very soft or hard, mostly the latter. The normal range of hardness for a good receiver seems to be about 35C Rockwell.

Model 98 bolts and some of the other working parts of the action were evidently made of medium- or high-carbon steel, so that these parts could be made much harder.

There seems to be no evidence to indicate that any re-heat-treatment of a soft M98 receiver will improve it or make it stronger. It is inadvisable, therefore, to have this done.

This brings up a question I'm often asked: "How do I go about selecting a good original Mauser 98 military action on which to build my own custom rifle?"

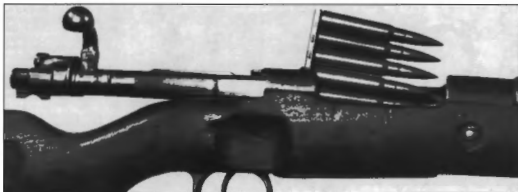
My suggestions are: Buy the action, or a complete rifle from which the action is to be taken, from a reputable dealer who will refund your money if for any reason you are not satisfied with the action or rifle they sell. Avoid those dated before 1920 and those dated after 1943. Finally, if possible to do so, pick one that was made by one of the better plants. For example, you can hardly go wrong in picking an action made in the 1930s having such names (or code letters) as Mauser, DWM, FN or Bmo (VZ-24) stamped on the receiver. After getting one of these actions there is no point in having

the receiver tested for hardness; whether it is somewhat harder than JSC Rockwell, or considerably softer, the action is still good.

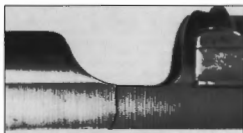
One final word of caution about very soft receivers: If you have an M98 rifle and you want to use the action for building a rifle—if of pre-1920 manufacture, or if the rifle shows evidence of having been used a great deal—it would be a very good idea to testfire it, preferably with several full-service rounds. After each firing, if the bolt handle can only be raised with difficulty, this may indicate locking lug set-back in the receiver ring. This is usually a sign that the receiver is very soft, and that the locking lugs have hammered depressions into the locking shoulders. The result is that when the bolt is opened the locking lugs must pass from the depressions to the higher undamaged part of the locking shoulders, forcing the bolt forward in so doing. The total set-back may be only a couple of thousandths of an inch, but even so, on opening the bolt the fired cartridge must be forced forward into the chamber the same amount. Such a receiver should not be re-used. This condition is not easily corrected and it indicates, possibly, a very soft receiver.

The "Short" Mauser Action

The regular or standard M98 action made for the 8mm Mauser cartridge, whether large or small ring type, is 8.75" in length. Various countries using the 7x57mm cartridge as their official military round adopted M98-action rifles that were, in some cases, slightly shorter than the regular 8mm Mauser action. The short Mexican M98 action was once the best known of the short actions. It is 8.50" in overall length. These Mexican actions, either small or large ring type, are scarce. However, during the past few years other short M98 actions



(Right) A cracked Model 98 receiver. The crack is located in the left receiver rail where the thumb slot is cut. This usually happens only with late WWII receivers, which were not always properly heat treated, and occurring only if the rifle or receiver is dropped on a hard floor.



(Above) The 8mm military cartridges were supplied in stripper clips. To load the rifle the bolt is opened, the loaded clip inserted into the clip-charger guideway slot in the receiver bridge and the cartridges pushed down into the magazine. The empty clip falls away when the bolt is closed, which feeds the top cartridge in the magazine into the chamber. Single cartridges can also be inserted into the partially empty or empty magazine by opening the bolt, dropping the cartridge in the receiver opening, and pressing it into the magazine with the thumb.

have appeared on the surplus market, chiefly the Model 24 Yugoslav.

Here are the dimensional specifications of the short M98 action and the regular length 8mm action:

Model 98 Mauser Action Data

	Short	Regular
Weight	43 oz.	45 oz.
Length overall	8.50"	8.75"
Bolt travel	4.40"	4.570"
Bolt body length	6.175"	6.375"
Guard screw spacing 7.625"	7.625"	
Magazine length	3.225"	3.320"

All other specifications are about the same for both actions.

The short M98 actions have long had, and still have, a great appeal to shooters and gunsmiths wanting to build lightweight sporting rifles for cartridges like the 220 Swift, 257 Roberts, 243 and 308 Winchester. When reading about short actions, the word "short" seems to have a magical appeal and shooters will go to almost any length to get such an action—only to find out later, as shown in the above table, that the short action is not as short or as light as they expected.

Strong and Weak Features

Without question the M98 Mauser is the best, strongest and most foolproof military thumbbolt action ever made. It has many out-

standing features which have been little improved upon in modern bolt actions, but like all actions, including the latest designs, the M98 Mauser has its faults and weak points. I shall list the various good and poor features as I see them—based on 50 years of experience in using, remodeling, rebarreling and building many rifles on these actions.

As I see it, the only major weak point in the M98 military action is the thumb notch in the left receiver side rail. I have seen a number of these actions with the left receiver rail cracked at this point. I have cracked one myself in letting it into a stock, another when I accidentally dropped it on a cement floor. Once I dropped a barreled action on the cement floor and the entire rear part of the receiver broke off at the thumb notch. Although the entire length of the right rail has no more metal in it than the thinnest part of the left rail at the thumb notch, it seems to be stronger and resists cracking when subjected to strain—much better than the left rail. This is probably due to the heat treatment given the receiver in which a thin area of metal between two larger masses of metal becomes harder, and thus more brittle, than a similar thin area not close to a larger mass. Another example is the receiver bridge; although the entire receiver has been given the same heat treatment or undergone the same hardening treatment, the thin receiver bridge is always

much harder to drill or tap than the much thicker receiver ring.

Commercial M98 type receivers made without the thumb notch are naturally much stiffer and more rigid than the notched military receivers, so they're usually preferred for sporting and target rifles. Some gunsmiths stiffen the military receiver by filling the thumb notch with a piece of pre-shaped steel and welding it in place.

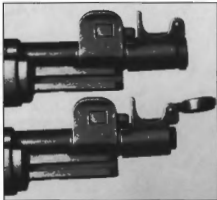
Although the 98 action is a very safe one, I believe it would be even safer by having one or two gas vent holes in the left side of the receiver ring and wall opposite the vent holes in the bolt, as in the 03A3 Springfield.

Not a weakness or a fault, but to me a nuisance, is that the bolt cannot (without a great deal of force) be closed on a cartridge that has been dropped into the chamber because the extractor will not slip over the rim. However, this minor nuisance can be corrected by careful alteration—shortening the extractor hook and increasing the forward slope is all that is needed.

It must be remembered that Paul Mauser designed this action solely for military use, and from this standpoint all other features of this action are outstanding. These include the inside collar in the receiver ring, the safety lug on the rear of the bolt, a very rugged extractor which will not let go of a cartridge rim when the bolt is opened, the simple and positive ignition system, the sturdy and reliable safety and bolt-stop, and the fine unbeatable magazine system.



Model 96 Mauser bolt face.



The M98a carbines have a special hinged muzzle cover. Rifles were stacked with the cap closed to protect the bore from the weather. By opening the spring loaded cap the bore could be cleaned from the muzzle. A hole in the cover, smaller than the bore, prevents wear and damage to the muzzle from the steel Mauser cleaning rod. The cover must be removed to fire the rifle. The projection on the rear of the cover blocks the view beyond the front sight. The 98a's rugged front sight has a forward hook to engage the muzzle cover. To remove the cover, close the cap, push down and turn 90 degrees counterclockwise.

Despite the "militariness" of this action, German and British gunsmiths soon found that it met all the requirements of sportsmen who desired a repeating magazine rifle for hunting large game. The M98 action was sometimes used "as issued." Even at the peak of European bolt-action sporting rifle development, the foreign sportsman demanded little more than the basic action, or at most only a lower profile of the bolt handle, and more convenient floorplate release and, for the Germans, a double-set trigger mechanism. American hunters, shooters and gunsmiths, however, demanded more from this action; in time it was found to be more adaptable and easier to remodel than any other military bolt action. So much so that it has been universally adopted by most amateur and professional gunsmiths as their first-choice military bolt action on which to build a rifle.

The M98 action is popular in the U.S. for several reasons, but primarily because it is readily available, especially since 1945. American shooters first became familiar with this action in fair numbers after WWI when the first souvenir rifles appeared. Commercial Mauser sporters had been imported since about 1910. However, it was not until after WWII that M98 military rifles and actions appeared in great numbers. Since that time countless thousands of these rifles and actions have reached the American market. Shortly after WWII commercial M98 actions began to appear, beginning with the Belgian-made FN and followed by others made in Yugoslavia, Sweden, West Germany, Spain and Japan.

There must certainly be far more M98-type actions and rifles in the U.S. than any other centerfire turnbolt design, and perhaps more than all these other actions combined.

The M98 Breeching

I have previously described the M98 breeching system which centers around the collar or ring inside the receiver. The flat

breech face of the barrel butts against this collar and the head of the bolt is recessed within the collar, touching the barrel when the bolt is locked. There are other breech systems that are much simpler and equally as strong and safe, but few of them offer the one advantage that has contributed to the unmatched popularity of this action—a feature seldom discussed.

Many people have said to me, "There are several firms making and offering low-cost turned, threaded and chambered barrels in various calibers and weights for the M98 action. Why don't they offer similar barrels for other actions like the '03 Springfield and 1917 Enfield, as well?" The answer is that there is no single military or commercial high-power bolt action that is as numerous or as popular, so low in cost, strong, safe and suitable for a variety of cartridges as is the M98 Mauser—and to which a barrel can be fitted so easily.

I cannot go into the detailed procedures of fitting and headspacing a barrel here. Suffice it to say that it is far easier to properly fit a barrel to the M98 than it is to fit one to most of the other military bolt actions, especially those not made to accommodate a flat-breech barrel. It is, however, possible and practicable to manufacture barrels for the M98 action to close enough tolerances so that a knowledgeable amateur gunsmith should be able to fit it properly to his action without the use of a metal lathe or chambering reamer. This would be very difficult, if not impossible, with an '03 Springfield or similar action. The reader should not get the impression from what has been said that fitting a barrel to the M98 action is a snap and simply requires turning it up tightly. This is not the case.

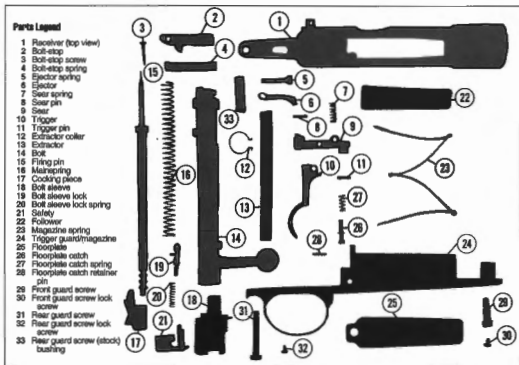
Constructing the M98

To begin with, it is only practicable to use a military M98 action for building a rifle if you can do all or at least most of the remodeling work yourself. For example, if you have an

action which cost you nothing, and hired the remodeling work done to equal the commercial FN Supreme Mauser action, then it probably would have been advisable to buy the commercial action in the first place. On the other hand, if you can do the remodeling yourself there is no military action quite as ideal as the M98 on which to build a rifle.

The standard M98 military action made for the 8mm Mauser cartridge has a magazine length opening of approximately 3.320" and, therefore, is best suited to cartridges loaded to a slightly shorter overall length. The bolt face recess and extractor are correct for any center-fire cartridge of 30-06 head size. Therefore, without modifying the magazine, bolt head or extractor, the standard M98 military action will handle such cartridges as these: 243, 244, 6mm Remington, 257 Roberts, 7mm Mauser, 284, 308, 8mm Mauser, 358 and wildcats based on these cases. The unaltered actions will usually handle shorter cartridges quite well, such as the 22-250, 225, 220 Swift and 250-3000. However, for perfect feeding it usually is necessary to install a filler block in the rear of the magazine and use a shorter follower for the shorter cartridges.

Lengthening the magazine is not too difficult. This makes the M98 action suitable for cartridges slightly longer than the 8mm Mauser. By thinning the rear and front magazine walls and altering the loading ramp, or by moving the front magazine wall forward and altering the loading ramp accordingly, it can handle most 30-06 or 270 length cartridges. Then, by opening up the bolt face recess and shortening the extractor hook, the action can handle such short belted-magnum cartridges as the 264 to 458. Opening up the magazine and altering the loading ramp enough for such longer magnum cartridges as the 300 H&H Magnum is not recommended since this greatly weakens the receiver where it supports the lower locking lug.



Mauser Model 98

Dimensional Action Specifications

Weight	45 oz.
Length	6.75"
Receiver ring dia.	
Large ring	1.410"
Small ring	1.300"
Bolt body dia.	.700"
Bolt travel	.4570"
Striker travel	.535"
Guard-screw spacing	.7825"
Magazine well opening	
Length	3.320"
Rear width	.520"
Front width	.490"
Bolt face partial recess:	
Depth	.045"
Dia.	.480"

General Specifications

Type	Tumbolt repeater.
Receiver	One-piece machined steel forging, unsorted bridge. Stripper-clip guide milled in bridge.
Bolt	One-piece, with dual-opposed locking lugs forward. A third lug on the bottom of the bolt acts as the safety lug.
Ignition	One-piece firing pin, coil mainspring and cocking piece. Cocks mainly on opening of bolt.
Magazine	Staggered column, nondetachable box magazine, 5-shot capacity. Detachable floorplate.
Trigger	Non-adjustable, double-stage military-type pull.
Safety	Rotary wing-type safety built into bolt sleeve. 180° swing from left to right, locking striker only when in upright position; locks both bolt and striker when at right.
Extractor	One-piece, nonrotating, long Mauser spring type attached to the bolt by a collar.
Bolt-stop	Separate, hinged to the left rear of receiver, stops bolt by contacting left locking lug.
Ejector	Swinging type, located in bolt-stop housing.

Remodeling the M98 military action is made easier by a number of accessories offered especially for it. There are trigger shoes available for the trigger, replacement safeties which will clear the lowest mounted scopes, quick-release floorplate devices, set-trigger mechanisms, fully adjustable single-stage trigger mechanisms with or without slide-type safeties. There are more scope mounts made

for the M98 action than for any other. If this is not enough, you can buy a stiffer mainspring to speed up the lock time (as well as making the action harder to operate). Last, but not least, chambered and finish-turned barrels are available in a number of popular calibers from several firms. Most of the accessories are easily installed by following the manufacturers

instructions, but unless you have the proper equipment for barrel fitting, I suggest you let a competent gunsmith do that job.

If a hunting scope is to be mounted low and over the bore—the only way it should be mounted—then the main alteration will be to the bolt handle so it will clear the eyepiece of the scope. The bolt handle can be forged to a



One of the author's favorite varmint rifles—a compact medium-weight rifle based on a short-necked Model 98 action. It is a single shot, chambered for the 219 Donaldson Weap. The medium-heavy 21" chrome-moly steel barrel has a 1:14 twist and is very accurate. Sighting is done with a very fine Unardt 1½" Varmint scope of 10x. Stock is of ultra-fancy southern lowe stump walnut, with the grip and forend checkered in a fleur-de-lis pattern.

low profile, or the original bolt handle cut off and it, or a new bolt handle, welded on in the low profile position. I prefer the latter, using an electric weld to attach the new handle. There are several gunsmithing books available which give detailed instructions on altering bolt handles, drilling and tapping the receiver for sights and scope mounts, installing barrels and altering the magazine, etc. If you want to do this work, and don't know how, get these books and find out. They include *The Modern Gunsmith* by W.J. Howe, *Modern Gunsmithing* by Clyde Baker and *Gunsmithing* by Roy Dunlap.

Model 98 Barrel Thread

Model 98 rifles have been made over a long period of time, in a number of countries and by many different firms. It is, therefore, natural to assume that not all of them were made with exactly the same barrel thread. What they all have in common is a Whitworth-type thread with a metric pitch. This is a 55-degree V-thread, usually with rounded bottom and crest. The metric pitch is very close to twelve threads per inch. The drawing of the barrel shank specification indicates the thread diameter is 1.100", the length of the shank .625", with a pitch of twelve threads per inch. The American standard V-thread has a 60-degree angle and it has long been a customary practice of American gunsmiths to use the 60-degree thread in fitting new barrels to Mauser actions, a practice that's perfectly acceptable. Barrelmakers producing threaded and chambered M98 replacement barrels must of necessity cut a minimum thread, so that the barrels will fit in practically every M98 action—this is also all right since a slightly loose thread fit is permissible. The important thing for the amateur to understand is that the barrel must be turned in and "set up" very tightly. The flat breech end of the barrel should contact the collar inside the receiver rather than

having the shoulder of the barrel contact the front of the receiver. The custom gunsmith, in threading a barrel for the M98, will cut the threads on the barrel to fit the individual action, and can achieve as tight a fit as he wishes—even with a 60-degree thread cutter.

Besides a fairly snug thread fit, the ideal fit is also to have both the breech end and the barrel shoulder contact the receiver, but with the breech end contacting the collar much more firmly.

M98 Military Rifles

This book is chiefly concerned with the actions of various centerfire turnbolt rifles and what can be done with them rather than with the original rifles. There were so many different military rifles based on the M98 action that to describe them all is beyond the scope of this book. For information on these many rifles, refer to our bibliography. The most informative of these titles are *Mauser Bolt Rifles* by L. Olson, *Mauser Rifles & Pistols* by Smith and *Small Arms of the World* by Smith.

A number of firms in Germany turned out huge quantities of M98 military rifles and it is estimated that several million had been made by the end of WWI in 1918. They were made by several commercial arms firms including Mauser, Sauer, Haenel and DWM. DWM made a million alone. The German government arsenals in Danzig, Erfurt, Spandau and Amberg also made vast quantities.

In the years following WWI there was only limited production of the M98, but in the mid-1930s, when Hitler began rattling his saber, production again went into high gear. This time many more firms got into the act, including some in German occupied countries. No one knows how many million M98s were made from this time until the defeat of Germany in 1945, but the quantity was immense.

The principal M98 arm of the pre-1918

period was the rifle with a 29.13" barrel. The main carbine version of that period was the M98a with a 23.62" barrel. The most common M98 developed after WWI, and the principal shoulder arm used during the WWII period, was the M98k with a 23.62" barrel. There were other variations, too numerous to mention, plus several variations of sniper's rifles used during both wars. The M98k carbine was developed in the mid-1920s and it eventually became the most frequently produced German military shoulder arm.

Markings

As previously mentioned, the many variations of the M98 military rifles were carried out by a number of different arms making plants in Germany, and later on in different plants in a number of other countries. In the period prior to the 1920s it was standard practice for each plant to stamp its name on the receiver ring, along with the year in which the rifle was made. The left receiver wall was usually stamped to indicate the model of the arm, such as "M/98," "GEW.98" or "KAR.98." Sometimes the name and address of the maker was stamped on the side of the receiver. The maker's insignia or the crest (coat of arms) of the country for which the rifle was made, was also sometimes stamped on the receiver ring.

In the 1930s a number-code system was inaugurated. Each of the producers of this rifle was given a code numeral which was stamped on the receiver ring, along with the date (year) of manufacture. Around 1940 this number code was largely replaced by a letter code; for example, the letters "byl" stamped on the receiver meant that the rifle was made by the Mauser Werke plant in Oberndorf. Earlier, when the number code was in use, the Mauser firm had the code number "42." During WWII usually only the last two digits of the year



Model 98a Mauser Carbine, one of several German military shoulder arms based on the Model 98 action. The M98a was used mostly during WWI.

Another of the author's favorite sporting rifles, this one based on the VZ-24 Czech

Mausers action. The stock, of classic design, is made from a fine-figured piece of American black walnut. It has a 24" sporter barrel and a Weaver K-10 scope. The action has a very fine Miller single-set trigger. This particular action and rifle has seen a lot of service. The action was made in 1939 and the military rifle from which it was taken had seen hard use since the bore was nearly worn out when it was obtained in 1945. The action was first fitted with a 220 Swift barrel. After firing about 1000 shots through this barrel it was replaced with one in the 220 Improved Swift caliber. After firing about 1500 times, it was replaced with another one in 225 Winchester caliber, and that one finally replaced by one in 243 caliber.

were stamped on the receiver, like "41" instead of "1941." During 1944 many manufacturers merely stamped one "4" on the receiver. Many of the early code numbers never have been unraveled, but the code letters are known. The list of these codes is too long to include here, but the interested reader can find them listed in *Mausers Bolt Rifles* by L. Olson and *Hatcher's Notebook* by J.S. Hatcher.

It was normal practice to prove all M98 military rifles and give them a serial number. Such proofmarks, the number of marks and their location on the receiver, barrel and perhaps on some other parts, varied. Since these are so varied and of little importance, I shall make no further mention of them. As for the serial numbering practices, there probably was no universal system employed among the many manufacturers during the entire period they were made, except that they did number them. It seems that some manufacturers merely stamped consecutively higher numbers on each rifle they made, and when the number reached a certain point they started over again. Thus there may be more than one rifle made by the same or a different manufacturer having the same serial number. Later on, each manufacturer was assigned a letter to be added to the serial number, for example 7436d, so that production figures could be kept secret. Regardless of the system or systems used, the serial number itself is not important since the date and manufacturer's name, or code, are stamped on the receiver. Generally, the full serial number is stamped on the side of the receiver ring and barrel, and either the complete number, or the last two digits of it is stamped on most of the other parts of the action. If all the numbers are the same on a given rifle or action, this indicates that all the parts are original with that rifle or

action. That the numbers match may be of some importance to the owner of an M98, but having matching numbers on an action which is to be used for building a rifle is of no consequence.

The 8mm Mauser Cartridge

Germany adopted the 8mm smokeless powder cartridge in 1888 along with the Model 88 Commission rifle, with which Paul Mauser had little to do. This cartridge is based on a rimless, bottlenecked case and was loaded with a bullet of .318" diameter. It was then officially known as the 7.9x57I or 8x57I*. The first figure in the cartridge designated the groove dimensions in millimeters, the second figure is the length of the case in millimeters, and the "I" stands for the German word "Infanterie." This military cartridge was normally loaded with a 227-grain jacketed round-nose bullet having a muzzle velocity of about 2100 fps at an average chamber pressure of about 45,500 psi.

When the M98 was adopted by Germany in 1898, it was also chambered for the 8x57I cartridge. The Germans soon wanted better ballistics from this cartridge, so about 1905 they adopted a new spitzer (pointed) bullet for the 8x57mm case, with a new diameter of .323". This cartridge was designated 7.9x 57IS or 8x57IS. This new bullet weighed 154 grains and in the new cartridge it was driven to a muzzle velocity of 2870 fps at a breech pressure of about 49,800 psi. When this larger bullet was adopted it became necessary to enlarge the rifle bore accordingly. This was done by increasing the groove diameter only, from .320" to .324". M98 rifles already made for the "I" cartridge were then rebarreled and chambered for the "IS" cartridge. Later on, a

*Common U.S.-English usage shows the "I" in prior as a "4," but this is incorrect.

heavier spitzer bullet with a boattail base was adopted and the 8x57 case loaded with this bullet became the standard German military cartridge designated as the 8x57S. This bullet weighed 198 grains and had a muzzle velocity of 2476 fps at a breech pressure level of nearly 50,000 psi. The 8x57S is a potent military cartridge with very impressive ballistics.

In the United States, the sporting version of the German 8mm cartridge is known simply as the 8mm Mauser or 8x57mm Mauser. Most U.S. ammunition makers loaded this cartridge years ago and made it with several different types and weights of bullets. However, since there was such a wide variety of rifles being used, chambered for the 8mm Mauser cartridge, some of which had actions of marginal strength or barrels bored too small for the bullets, the cartridge manufacturers became concerned.

In due time, the 8mm Mauser cartridge loaded in the U.S. evolved into a single-bulleted loading which developed only mild breech pressures so that it could be fired in most 8mm Mauser rifles. Therefore, as loaded today by Federal, Winchester and Remington, it has a 170-grain jacketed softpoint bullet giving a muzzle velocity of about 2500 to 2570 fps at a pressure level of about 34,000 psi. Gauged by modern standards, or compared to a cartridge like the 30-06 with the 180-grain bullet, the U.S.-loaded 8mm Mauser cartridge appears outdated. This is not the case, however, for these 8mm Mauser cartridges are equal to the 30-40 and 303 British for taking most species of North American big game animals.

The 8mm Mauser cartridge is very responsive to handloading, and the careful handloader having a sound M98 military or sporterized rifle can reload the case to nearly equal the 30-06 in performance.

Built by the author, this medium-weight (about 10 pounds) varmint rifle has a 24" medium barrel chambered for the 219 Improved Zipper cartridge. Stock is of extra fancy American black walnut fitted with Niedner-type checkered buttplate and pistol grip cap. Weaver K-10 scope is mounted very low in steel Tilden mounts. Front and rear of magazine are blocked off, the follower shortened to handle the rimmed cartridges. The action is fitted with a German double-set trigger.



Mauser Models 71 & 71/84

IF THERE WERE a Hall of Fame for firearms designers and inventors, the accomplishments of German-born Peter Paul Mauser would certainly be displayed most prominently, because he, like our own John M. Browning, was one of the world's foremost creators of firearms mechanisms.

The Model 71 was the first successful rifle designed and produced by Paul Mauser, but this achievement did not come easy, and it was coupled with a personal disaster which would have stopped many a man not as hardy as Paul Mauser. Its success signaled the start of a long career of firearms development which ultimately led to the Model 98 Mauser action system, unquestionably the best military turnbolt action ever designed.

It was natural that Paul Mauser (1838-1914) became a gunmaker; his father and six older brothers were also gunmakers. After some schooling and an apprenticeship in the gunmaking trade, he began to show an interest in gun design while working in a government arms factory in Oberndorf, Germany.

Wilhelm Mauser (1834-1882), Paul's brother, four years older, was also interested in firearms development work, and they worked together until his death. Paul, however, had the brains and hands for the mechanical details, while Wilhelm handled the business end. Together they developed the M71, obtained a contract and set up a factory to produce them.

Paul and Wilhelm probably began working together in the mid-1860s. Their first efforts were focused on improving the Dreyse needle rifle, at that time a widely used breech-loading military arm. Its firing mechanism had a long needle-like firing pin which had to penetrate the paper cartridge case and powder charge to detonate the primer, positioned at the base of the bullet. Their initial improve-

ment changed the action to cock on the uplift of the bolt handle. About the same time, they converted the action to use a metallic cartridge, its primer located in the case head. It appears the Mauser brothers also worked over the Chassepot action in a similar manner, but failed to sell their ideas to modernize these rifles.

The Mausers then, about 1867, built some rifles on actions of their own design incorporating these new features, but again they failed to sell their new rifle design. However, an American arms salesman, Samuel Norris, representing Remington, heard of their rifle and thought it showed promise.

Norris negotiated a partnership with the Mausers, and evidently thought enough of the Mauser action to have it patented in the United States. This patent, No.78,603, was granted to him and the Mausers on June 2, 1868. This action, known as the Mauser-Norris, was the first patented design bearing Paul Mauser's name.

Meanwhile, the Mauser brothers continued working to design and develop a rifle action which would interest someone, Remington having failed to take up the patented rifle. Discarding many of the Mauser-Norris features, they built another rifle with several important aspects. The new rifles were given to the Prussian army for testing. After these tests a few changes were suggested. The Mauser brothers made the necessary changes, following which the Prussian commission tested the new rifles and found them good. The new rifle was officially adopted in 1871, and the Mauser brothers received a contract. They were in business at last! (The Mauser-Norris, or the Mauser M67/69, as it is also known, and a second Mauser rifle, known as the Interim Model, are extremely rare. Only a few test rifles were made, and fewer exist today.)

The M71 and their next rifle, the M71/84,

were made in large numbers, and are still common today. I will limit my detailed discussion in this chapter to these two models.

The Model 71 Mauser

With the Prussian contract in hand, the Mauser brothers set up a small temporary shop in Oberndorf, then moved to larger quarters in 1872. In 1874 the new factory was destroyed by fire, but they promptly rebuilt and resumed production of the M71. Not long after they were given a new contract to make 100,000 M71s. They granted licenses and received royalties from other arm-making firms, which also began producing 71s in large numbers. M71s were made in various German government arsenals at Amberg, Danzig, Erfurt and Spandau, and in the great Austrian arms center at Steyr. While the M71 became the standard shoulder arm for the entire German empire, the Steyr factory built thousands of them for China, Japan and other countries. All in all, huge quantities were made from 1872 to 1884 and, though they were more or less obsolete by the latter date, many were not retired from service until years later.

The M71 Mauser was made in several styles. Foremost was the M71 rifle with a barrel 33.5" long, 53" overall and weighing about 10 pounds. The M71 Jaeger rifle has a 29.45" barrel, is 48.75" overall and weighs about 9 pounds. The M71 short rifle weighs about 8.5 pounds and has a 20.5" barrel.

The M71 Carbine has a 20" barrel, is about 39.5" overall, and weighs about 7.5 pounds. All were chambered for the 11mm Mauser cartridge.

The M71 Mauser Action

The receiver, a one-piece iron or steel cast-

(Above) The M71/84 Mauser rifle.



The Model 71 Mauser carbine. Chambered for the 11mm (43-caliber) Mauser cartridge, this carbine has a 20" barrel, is 39.25" overall and weighs about 7.6 pounds. The model designation, stamped on the left side of the receiver, is "K. MOD. 71". The date (year) of manufacture is stamped on the right side of the receiver. On the top flat over the breech end of the barrel is stamped the makers name, on this one: "GEBR MAUSER & CO OBERNDORF."

ing or forging, is bored lengthwise to accept the bolt; the front end, about 1" long, is threaded to take the barrel shank. Beginning behind the ring, part of the top and right side of the receiver is milled away, leaving a loading port about 3.12" long. The receiver bridge behind the loading port is slotted to allow passage of the bolt handle and bolt guide rib. Behind the bridge the receiver is milled down to form a tang.

The steel bolt body is cylindrical, drilled out from the front. Integral with the bolt body is a heavy longitudinal guide rib and a bolt handle with a round grasping ball. With the bolt in the receiver and the bolt handle turned down, the rear end of this rib lies in front of the right receiver bridge wall, locking the bolt in the receiver.

The M71 bolt has a separate head which does not rotate with the bolt when the handle is raised or lowered. The rear end of the bolt head fits partly into the front of the bolt, and is drawn back with the bolt by a collar which fits into a notch cut under the front part of the bolt rib. The face of the bolt head is not recessed for the cartridge rim. The one-piece extractor spring is fitted into the left side of the bolt head, its rear end held in place by the bolt body.

The one-piece firing pin, and the coil mainspring which surrounds it, fits inside the bolt through the front end. The mainspring is compressed between the step-down in the rear of the bolt and the collar on the front of the firing pin. The firing pin extends through the rear of the bolt, through the heavy cocking piece, and all are held in place by the firing pin nut which threads on the rear end of the firing pin. A deep notch in the rear end of the bolt, and a matching projection on the front of the cocking piece, cause the cocking piece to be pushed back when the bolt handle is raised to cock the action. A heavy rib on top of the cocking piece extends forward into the slot in the receiver bridge, which prevents the cocking piece from turning when the bolt handle is raised or lowered. The safety is fitted into a hole drilled lengthwise into the rib on the cocking piece, and is held in place by a cross pin. When the action is cocked and closed, the safety, when swung to the right, cams the cocking piece back slightly off of the sear and locks it there, at the same time locking the bolt so it cannot be opened.

On opening the bolt, the front end of the bolt rib, contacting an inclined surface on the rear of the receiver ring, forces the bolt back to provide the initial extraction power. Conversely, the rear end of the rib, its locking surface, and the top corner of the right receiver bridge wall are similarly rounded or angled so that, on closing the bolt and lowering the bolt handle, the bolt is forced forward to seat the cartridge in the chamber. A heavy washer, held on the bolt rib with a screw, acts as the bolt-stop when the bolt is opened—then the washer contacts the semi-circular cuts in the top edges of the receiver bridge walls.

The sear is attached to a long spring member by a pin, the spring being attached to the solid bottom of the receiver with a screw. The trigger, also attached to the end of this spring, pivots on a pin. The sear projects upwards through a hole in the receiver, contacting the bottom of the cocking piece when the action is operated. The trigger has three small humps where it contacts the receiver. On pulling the trigger back, the first hump causes the sear to be pulled down almost all the way off of the cocking piece, but after the second hump touches the receiver only an additional short pull on the trigger moves the sear free of the cocking piece to fire the rifle. This is the standard military double stage trigger let-off. The third hump on the trigger is provided to move the sear all the way down, when the trigger is pulled back all the way, so the bolt can be withdrawn from the receiver, but only after the bolt-stop screw and washer are loosened.

The M71 has a one-piece walnut buttstock and forend. A long narrow plate is inletted into the bottom of the stock under the action. Two sturdy screws—one through the receiver tang and stock threads into this plate, the other, through the front end of this plate and stock, threads into the receiver—hold the action in the stock. These two screws, the rear end of the receiver tang and an upright projection on the front end of the trigger guard plate all tend to prevent setback of the action in the stock from the recoil of firing the rifle. The trigger guard bow is screwed to the plate to protect the trigger. Barrel bands around the barrel and forend hold the forend against the barrel.

The M71 has a simple yet reliable action, well made and convenient to operate.

Takedown and Assembly

To remove the bolt, raise the bolt handle and pull the bolt back as far as it will go. Turn out the bolt-stop washer screw and remove the washer. While pulling back on the trigger, pull the bolt assembly from the receiver.

To disassemble the bolt, first turn the cocking piece one-quarter turn counterclockwise



Left side of the M71/84 Mauser action, opened.

so that the cocking piece is forward. Pull the bolt head from the bolt, then pull the extractor from the bolt head. Rest the firing pin tip on a hard surface and press down on the cocking piece so the firing pin nut can be unscrewed from the firing pin. The firing pin and main-spring can then be pulled from the bolt and the parts separated. Drive out the safety pin to remove the safety. Reassemble in reverse order.

To remove the barrel and action from the stock, first unscrew the ramrod and pull it from the forend, then remove the barrel bands. Turn out the tung screw and the front trigger guard plate screw, then lift the barrel and action from the stock. The trigger assembly can then be removed by turning out the trigger/sear spring screw. Reassemble in reverse order. The barrel is threaded tightly into the receiver (right-hand threads) and is not easily removed.

M 71/84 Mauser Rifles

Wilhelm Mauser died in 1882, but even before this Paul Mauser was working alone on further development of the M71 action. By this time most military nations began to see the wisdom of adopting a repeating rifle for their armed forces. Paul Mauser began working on a repeating mechanism for the M71 in the late 1870s, and it was pretty well perfected by 1881, when he demonstrated it before German officials. The conversion, on which he obtained a patent, was effected by installing a magazine tube in the forend under the barrel and providing a carrier in the bottom of the receiver to lift the cartridge

from the magazine to the receiver opening. The demonstration was successful and Mauser soon obtained contracts to make these repeating rifles—designated the M71/84. The M71/84 rifles were not converted M71s, but were entirely a new manufacture.

The M71/84 Mauser rifle has a 30.5" barrel, is 51" overall and weighs about 10.2 pounds. It is chambered for the 11mm Mauser cartridge, and the tubular magazine has a capacity of nine rounds. It was the official German shoulder arm from 1884 to 1888, at which time Germany adopted the Model 88 Commission rifle chambered for the 8mm cartridge. Although a great many of the M71/84s were made during these four years, probably not enough were made to entirely replace the M71 rifles then in use in Germany.

The M71/84 Action

To say that the M71/84 Mauser action is a M71 with a cartridge carrier added is an oversimplification. Adding a carrier and making the action a repeater required considerable changing of the receiver, plus adding parts such as the carrier, cartridge stop, ejector, cutoff and some means to cause the carrier to tip up and down when the bolt is operated. Adding these parts also necessitated changing other parts such as the trigger mechanism. I will enumerate and briefly describe all of these changes.

1. Receiver: The receiver of the M71/84 is similar in profile to the M71 receiver but, instead of being round with a solid bottom,

it is made with a heavy rectangular box underneath it, which is in turn milled and machined to accept the various parts of the repeating mechanism, leaving an opening in the boltway through which the cartridges may pass. The rear part of this box acts as a recoil-lug surface transmitting the recoil to the stock.

2. Carrier: The heavy cartridge carrier (often called the "lifter") with its U-shaped trough is fitted into the box below the receiver; it is held in place by, and pivots on, a heavy pin through the rear of the box. A large-headed lock screw holds this pin in place. The carrier is tipped up and down by a cam fitted into recesses cut into the left side of the carrier and receiver-box wall. This cam pivots on a stud which is part of the magazine cutoff lever, which in turn pivots on a stud set into a hole on the left, outside of the receiver.

The cutoff is held in place and is provided two-position tension by a spring screwed to the receiver. A checkered thumb-piece on top of the cutoff lever projects above the stock line and allows the cutoff to be moved. When the cutoff is tipped back the cam is raised so its upper, rounded end projects into the ejector raceway. When moved or tipped forward, the cutoff lowers the carrier cam within the carrier box so it is out of contact with the ejector.

3. Ejector: To actuate the carrier, that is, to tip it up and down, an ejector rib is incorporated with the bolt assembly. It is as long as the entire bolt and is attached to it by a spring clamp on its front end, engaging a



The M71/84 Mauser action.

groove in the bolt head. There is a small lug under the ejector which fits into a hole in the bolt head and another lug on the cocking piece which fits in a groove in the rear part of the ejector—this helps align these parts and holds the ejector in place. A raceway is milled into the inside left receiver wall for the ejector and, besides its other functions, helps guide the bolt and prevents it from binding. The main function of this long ejector, however, is to activate the carrier and to eject the fired cases from the action. There is a recess groove milled in the outside bottom edge of this rib and, when the cutoff is tipped back to bring the carrier cam up, the end of a cam is brought up into this groove. Thus, when the bolt is opened and the end of the groove contacts the cam, the carrier is tipped up. It is tipped down again when the bolt is fully closed and the rear end of the groove pushes the cam, tipping the carrier down once more, to pick up a new cartridge from the tubular magazine.

Functioning as the ejector, the front end of this rib projects through a groove cut into the recessed bolt face. It is made to have some longitudinal movement on the bolt. As the bolt is opened and the rib strikes the carrier cam, the bolt moves slightly farther back than the ejector to tip the cartridge case to the right and out of the action. When the cutoff is tipped back to disengage the carrier cam from the ejector, a stud on the front inside of the cutoff spring, projecting through a hole in the ejector raceway, contacts the end of the ejector groove instead of the cam, halting the ejector as before to eject the case.

4. Cartridge stop: Part of the repeating system is the cartridge stop built into the left side of the carrier box. It is a lever, pivoted on a

pin set in a groove in the side of the box and given tension by a spring which also places the carrier under tension. There is a projection on the front end of the cartridge stop which extends inside the box just ahead of the carrier, and is activated to release a cartridge from the magazine when the carrier is tipped down, and holding back the cartridges when the carrier is up.

5. Magazine: To complete the repeating system a magazine tube is fitted into the forend, with its rear end extending into a hole in the front of the carrier box. The front end of the magazine tube has a thread-on cap, while a long thin magazine spring and plug follower completes the magazine. A cross-key between the front end of the magazine tube and the barrel prevents the tube from sliding forward from the recoil of the rifle.

6. Trigger: Because of the carrier box on the M71/84 receiver, a different trigger arrangement had to be designed. This kept the firing pin from turning.

7. Safety: The safety was improved in two ways. First, instead of using a cross pin as in the M71 action, the safety and the firing pin nut were so made that the nut held the safety in place. Second, by having a coil spring around the safety stem to push the safety back, the safety also prevents possible loss of the screw and stop washer when the bolt is removed. The extractor is positioned on the top, right-hand side of the bolt head instead of on the left as in the M71 action. The trigger guard bow is made as an integral part of the trigger guard plate, and a screw through the inside bottom of the stock holds the trigger guard in the stock when the two guard screws are removed.

8. Minor changes: Other changes were made in the M71/84. A cross pin through the

bolt rib prevents the bolt-stop screw from being turned out completely, which is done by making a separate sear lever pivoted on a pin at the rear of the carrier box. A coil spring, set in a hole in the sear lever, gives it tension. The sear and the trigger, fitted to the rear end of the sear lever, are held in place by pins just as in the M71. The trigger has the same double-stage pull.

In practically every other respect the M71/84 action is about the same as the M71 action. The extractor, bolt body, firing pin, main-spring, bolt head, bolt handle and bolt-stop are all similar to the Model 71. The locking system is the same, and so are the extractor camming and bolt camming features.

Minor design and construction changes were made in the 71 and 71/84 Mausers when they were in production, but these changes are of little importance and I have not thoroughly examined enough of these rifles to describe them in detail.

Takedown and Assembly

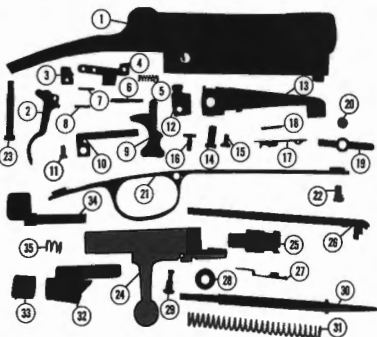
Make sure the chamber and magazine are empty. To remove the bolt proceed as follows: If the cutoff button is not in the forward position, open the bolt and pull it back to raise the carrier, then push the cutoff forward. Loosen the bolt stop screw several turns or as far as it will go without resistance. (Note: there is a cross pin through the bolt rib which prevents the complete removal of the bolt-stop screw. If it is necessary to remove this screw completely, then the cross pin must first be driven out.) Open the bolt and pull it back. Tip the rifle far over to the right, making sure the bolt-stop washer is against the head of the bolt-stop screw, then move the cutoff lever back about $\frac{1}{4}$ " to raise the cutoff spring slightly. The bolt can then be pulled from the

PART I: Military Rifles & Actions

Parts Legend

- 1 Receiver (side view)
- 2 Trigger
- 3 Sear
- 4 Sear holder
- 5 Sear holder spring
- 6 Sear holder pin
- 7 Sear pin
- 8 Trigger pin
- 9 Cutoff
- 10 Cutoff spring
- 11 Cutoff spring screw
- 12 Carrier cam
- 13 Carrier (lifter)
- 14 Carrier pin
- 15 Carrier pin lock screw
- 16 Center trigger guard screw
- 17 Cartridge stop
- 18 Cartridge stop pin
- 19 Cartridge stop/carrier spring
- 20 Cartridge stop/carrier spring screw
- 21 Trigger guard
- 22 Front trigger guard screw
- 23 Rear trigger guard screw
- 24 Bolt
- 25 Bolt head
- 26 Ejector
- 27 Extractor
- 28 Bolt-stop washer
- 29 Bolt-stop washer screw
- 30 Firing pin
- 31 Main spring
- 32 Cocking piece
- 33 Firing pin nut
- 34 Safety
- 35 Safety spring

Not shown:
Bolt-stop screw pin



Mauser 71/84

Dimensional Action Specifications

Weight (approx.)	3.5 lbs.
Receiver length	10.5"
Receiver ring dia.	1.290"
Bolt dia.	.735"
Striker travel	.565"
Bolt travel	.3365"
Bolt face recesses:	
Depth	.065"
Dist.	.505"

receiver. To replace the bolt the cutoff must be forward.

To disassemble the bolt: Lift up the rear end of the ejector and remove it from the bolt. Turn the bolt head one-quarter turn in either direction and pull it from the bolt body. The extractor can then be lifted from the bolt head. Now, rest the firing pin tip on the workbench, and while pressing down on the safety with the thumb of the hand grasping the bolt, unscrew the firing pin nut.

After the nut is removed, the firing pin and mainspring can be removed from the bolt and the safety removed from the cocking piece.

General Specifications

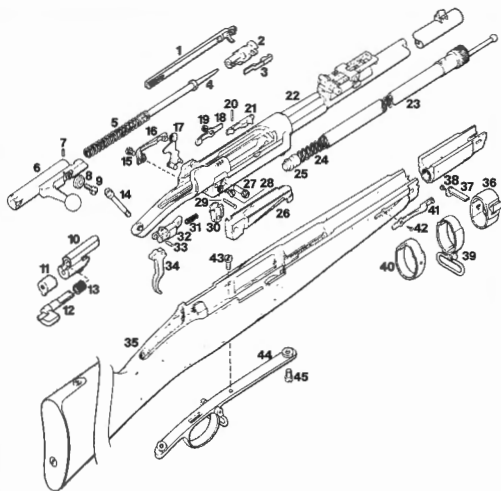
Type	Turnbolt repeater.
Receiver	One-piece machined steel forging. Slotted bridge.
Bolt	Two-piece with separate non-rotating bolt head. Rib on bolt body forms the only locking lug, engages in front of receiver bridge wall.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening of the bolt.
Magazine	Tubular magazine in forend. Cartridges transported from magazine to chamber by carrier (lifter).
Bolt-stop	Screw and washer on the bolt body stop bolt as the washer contacts groove on receiver bridge.
Trigger	Non-adjustable, two-stage military type.
Safety	Swinging wing-type built into cocking piece. Locks striker and bolt when swung right.
Extractor	One-piece spring type fitted into bolt head.
Magazine cutoff	Lever type disengages carrier when pushed forward.
Ejector	Sliding type fitted to bolt.

Reassemble in reverse order.

To remove the barrel and action from the stock: Remove the small screw from the left side of the muzzle barrel band and drive out the cross-key to the left. Slide the muzzle band off the barrel. Also, remove the other barrel band or bands. Pull out the magazine tube about 1". Turn out the front and rear

trigger guard screws; the barrel and action can now be lifted from the stock. Turn out the center guard screw and the trigger guard can be removed. Reassemble in reverse order.

To disassemble the rest of the action, first turn out the cutoff spring screw and remove the cutoff spring. Lift out the cutoff. Turn out

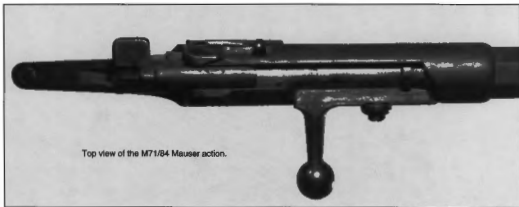


Parts Legend

- 1 Ejector
- 2 Bolt Head
- 3 Extractor
- 4 Firing Pin
- 5 Firing Pin Spring
- 6 Bolt Body
- 7 Retainer Pin
- 8 Bolt-Stop
- 9 Bolt-Stop Screw
- 10 Cooking Piece
- 11 Firing Pin Nut
- 12 Safety Catch
- 13 Safety Catch Spring
- 14 Rear Guard Screw

- 15 Cutoff Spring Screw
- 16 Cutoff Spring
- 17 Cutoff Lever
- 18 Cartridge Lifter Detent
- 19 Detent Retainer Screw
- 20 Cartridge Stop Pin
- 21 Cartridge Stop
- 22 Barrel and Receiver
- 23 Magazine Tube
- 24 Magazine Spring
- 25 Magazine Follower
- 26 Cartridge Lifter
- 27 Cartridge Lifter Hinge
- 28 Hinge Lock Screw
- 29 Sear Hinge Pin
- 30 Cutoff Cam

- 31 Sear Spring
- 32 Sear
- 33 Trigger Pin
- 34 Trigger
- 35 Stock
- 36 Forward Band
- 37 Cross Key
- 38 Key Retaining Screw
- 39 Middle Band
- 40 Rear Band
- 41 Band Spring
- 42 Band Spring Screw
- 43 Center Trigger Guard Screw
- 44 Trigger Guard
- 45 Front Guard Screw



Top view of the M71/84 Mauser action.

the carrier pin lock screw and lift out the carrier pin. Remove the carrier and carrier cam from the bottom of the action. Drive out the sear holder pin to remove the sear and trigger assembly. Reassemble in reverse order.

M71 and 71/84 Markings

Both the M71 and M71/84 Mauser rifles are easily identified by the stampings on the left side of the receiver. I G Mod. 71 is stamped on the 71 and I G Mod. 71/84 on the M71/84. The name of the manufacturer, such as Spandau, Amberg, et al, is usually stamped on the top flat of the breech end of the barrel on both models, along with a crown. The date (year) of manufacture is usually stamped on the right wall of the receiver bridge. Both models are serial numbered, with the numbers stamped on the receiver ring, breech end of the barrel and bolt, with the last two digits of that number stamped on most of the other parts.

Various German proofmarks are stamped on the barrel, receiver and bolt, as well as various inspector's marks. A small number "11"

stamped over the chamber indicates caliber 11mm.

Comments

The first Mauser rifle I ever owned was a Model 71/84, and with it came several boxes of fresh commercial ammunition. It was a carbine, in excellent condition, with a very nice light colored walnut stock. At that time I lived a long way from any boar hunting, but I often swung and snapped that rifle at a picture of a charging wild boar in my room. I fired that carbine a number of times at targets and enjoyed shooting it despite its heavy recoil. I don't recall what became of it; I probably swapped it off for something more suited to my hunting needs.

Most likely many more M71s were made than were M71/84s, but both have been quite common in the U.S. since the turn of the century. After WWII a great many more were imported and sold; as late as 1967 one firm still offered M71/84s in very good condition for less than \$15.

11 mm Mauser Cartridge

The 11.15x60R (.43") Mauser cartridge, also designed by the Mauser brothers, was introduced with their M71 rifle in 1871. A rimmed and bottlenecked cartridge with a case 60mm long, for military use the standard original load was 77 grains of blackpowder behind a round-nosed lead bullet of 385 grains. Muzzle velocity was about 1440 fps. The standard military load for the M71/84 rifle had a flat-point bullet, otherwise it was identical.

The 11mm Mauser cartridge is practically the same as other 11mm military loads developed during the 1870s like the 43 Spanish, 11mm French Gras, 11mm Belgian Comblain and others. Like many cartridges developed for Mauser rifles, the 11mm Mauser became popular for sporting use in "as issued" M71 and M71/84 rifles and carbines, in remodeled military rifles, and in some sporting rifles specially chambered for it. Because of the many M71 and M71/84 Mauser rifles sold in the U.S. and Canada by Francis Bannerman & Son, both Remington and Winchester have loaded ammunition for it.



AFTER SEVERAL YEARS of use by their armies, the Model 1889 (Belgian), 1890 (Turkish) and 1891 (Argentine) Mauser rifles, all essentially the same action, began to show some design and construction faults: The small spring extractor, with its narrow hook, proved unreliable; the magazine charger clip and clip guide, on the receiver bridge, proved faulty; the detachable box magazines were often lost and, because the magazine projected below the stock line, the rifles were not always easily carried. The trigger could be pulled regardless of position of the bolt; the threaded connection between striker rod and cocking piece often presented an assembly problem; the action had too many parts and needed simplifying. Double loading was possible—that is, unless the bolt was fully closed and locked after chambering each cartridge, the bolt could be opened without extracting and ejecting the chambered cartridge and the next round would jam behind it on reclosing the bolt.

Paul Mauser, hoping to gain new arms contracts, set to work to improve, strengthen and simplify this action. This effort led to the development of the Model 1892 Mauser (a few of which were made for Spain) and, shortly thereafter, to the Model 1893 Mauser—destined to become a worldwide favorite.

In the transitional M92, Paul Mauser introduced the long, non-rotating extractor attached to the bolt body with a collar. This extractor prevented double loading, since the cartridge head could slip behind the extractor hook when pushed out of the magazine. The cartridge was extracted and ejected on opening the bolt, even if the bolt had not been fully closed. The magazine box was made part of the trigger guard, so it could not be detached and lost, but it was still a single-

column affair projecting below the stock line. A pin was provided at the front of the sear, projecting into the receiver and matching a notch milled in the bolt body, so that the trigger could not be pulled unless the bolt was fully closed and locked. The magazine clip-charger and charger guide were improved, eliminating the need for the bolt-stop to hold the clip in place. Instead of threads, the cocking piece and firing pin had interrupted lugs so these parts could not be assembled incorrectly. A thin bolt guide-rib, milled in the center of the left locking lug raceway over which the slotted locking lug passed as the bolt was operated, helped to prevent the bolt from binding as it opened and closed. Introduced with the M92 Spanish rifle was the now famous 7mm Mauser (7x57mm) cartridge.

Although the M1892 Spanish rifle was an improvement over its predecessors, it had a short life. The same was true for the test Model 92/93 Spanish Navy carbine in 7.65mm caliber, only a few hundred being made. Apparently Mauser was dissatisfied with the single-column magazine arrangement in the rifles, for in 1893 he introduced the flush, staggered-column box magazine.

The new rifle, with its new magazine, was entered in the Spanish trials, where it was a huge success. It was promptly and enthusiastically adopted by Spain and designated the Spanish Model 93. Apart from having the new magazine/trigger guard combination, and the receiver altered to accept this magazine, the rest of the action was essentially the same as the M92. The M93 safety, however, was simplified by eliminating the spring and plunger.

Model 93 and 96 Actions

The receiver of the M93 Mauser is a machined, one-piece steel forging. The bot-

tom is flat for most of its length. The recoil lug, about $\frac{1}{4}$ " back from the forward edge of the receiver ring, is about .225" deep and 1.086" wide. The barrel has twelve threads per inch (V-type, 55 degrees). The barrel is flat at the breech and is made with a shoulder to butt against the front of the flat receiver ring, rather than against a collar inside the receiver ring. The receiver is the same width throughout, thus the left side of the receiver ring, wall and bridge is an evenly rounded surface. The front part of the receiver bridge is of the same radius as the receiver ring and a clip-charger guide-way is milled into this area. Behind the clip-loading guideway, the receiver bridge is machined to a smaller diameter to reduce weight. The receiver ends in a tang about 2.5" long.

The one-piece bolt has dual-opposed locking lugs on its forward end, these engaging shoulders milled in the receiver ring which securely hold the bolt against the barrel breech when the bolt is closed. The right (or bottom) lug is solid; the larger left (or top) lug, being slotted, allows the ejector to pass. The left locking lug raceway in the receiver is milled to leave a long ridge or rib of metal down its center, matching the ejector slot in the locking lug. This rib acts as a guide and helps to keep the bolt from binding as it is opened or closed.

The bolt face is partly recessed to enclose about two-thirds of the cartridge head extractor rim. The left locking lug extends ahead of the bolt face and forms part of the cartridge rim recess. The recess is about .060" deep, slightly deeper than the

(Above) The 7mm Spanish Model 93 Mauser Short Rifle, 21.75" barrel, 41.3" overall, weight about 8.3 pounds.

thickness of the 7mm Mauser cartridge extractor rim.

The long spring extractor is attached to the outside of the bolt by a collar which fits into a groove in the bolt body. Hooks at the ends of the collar engage in a mortise, cut into the inside of the extractor, holding the extractor against the bolt. A lip machined inside the front of the extractor engages a groove cut partly around the bolt head to prevent longitudinal movement of the extractor on the bolt. The extractor's beveled hook extends over the bolt face rim far enough to engage the extractor rim on the cartridge, thus holding it against the extended left locking lug for proper extraction and ejection of the cartridge, or fired case. The extractor does not rotate on the cartridge head as the bolt is opened, but only moves back and forth with the bolt.

All M93 and M95 bolts, including the variant M94 and M96 Swedish Mausers, have part of the cartridge rim recess cut away, permitting the cartridge rim to rise and slip under the extractor hook as it emerges from the magazine. The extractor hook is made to hold the cartridge head in place within the bolt head. The extractor will hold it there until the cartridge or case is ejected when the bolt is opened. This feature prevents double-loading, since the extractor engages each cartridge as it leaves the magazine and will extract and eject it when the bolt is opened—even though the bolt was not entirely closed or locked. Most of these rifles permit the bolt to close on a cartridge singly loaded into the chamber ahead of the extractor, but not all. A few require some extra force to close and lock the bolt on a



Model 93 Spanish Mauser action.

cartridge in the chamber—the extractor hook does not easily snap over the case rim.

The bolt handle, at the extreme rear of the bolt, is forged as an integral part. The shank of the handle ends in a round grasping ball. On most M93 and M95 rifles the shank is straight, the bolt handle sticks straight out or horizontal. On some short rifles or carbines the shank is bent down to bring the grasping ball closer to the stock. At the left rear of the receiver bridge a rearward slope forms a camming surface against which the bolt handle's square base moves as the bolt is opened. This provides initial camming power to the extractor.

The bolt sleeve threads into the rear of the bolt body. The coil mainspring slips over the firing pin and is compressed between the bolt sleeve and a shoulder at the front of the firing pin. The rear end of the firing pin

extends through the bolt sleeve and is held to the cocking piece by a series of interrupted lugs. The rear part of the firing pin is milled flat on two sides to match a hole through the bolt sleeve. This prevents the firing pin from rotating and coming loose from the cocking piece. A cam on the cocking piece extends through a slot in the bolt sleeve and slides in a groove cut into the receiver tang. The cam catches the rear end of the bolt or sear, depending on whether the action is cocked or uncocked. The rear of the bolt is notched in two places. The front end of the cocking cam can engage either a deep notch, when the bolt is closed so the firing pin tip can reach the primer, or a shallower notch when the bolt handle is raised or the bolt opened. The purpose of the shallow notch is to retain the firing pin tip within the face of the bolt, and to prevent the bolt sleeve from being



Model 93 Spanish Mauser action open.



Left side view of Model 93 Spanish Mauers action, cocked, with wing safety upright.

easily turned out of position when the bolt is opened. The firing pin is cocked on the closing motion of the bolt.

The wing safety has a round stem which fits lengthwise into a hole at the top of the bolt sleeve. It is held in place by the wing overlapping a lip on the bolt sleeve. A notch in the right side of this lip allows the safety to be removed, but not while the striker head is in place. Swung to the far left the safety is disengaged. It is then in the "off" or "fire" position. Swung upright to the intermediate position, the safety locks the striker back and the bolt can be opened and closed. Swung to the far right to the "on" or "safe" position, the safety locks the striker back and the bolt closed. When the safety is either up or to the right, it draws and holds the cocking piece off the sear—the sear will still be in position ready to engage the cocking piece when the safety is moved to the "fire" position. With the safety upright, this offers a safe way to unload the magazine, chambering and ejecting cartridges with the bolt. No bolt sleeve

lock is provided, therefore, the slightest touch against the bolt sleeve or safety, when the bolt is open, could cause it to rotate counter-clockwise and twist out of alignment with the receiver, prohibiting closure of the bolt.

Most M93 and M95 Mauers, including the German-made Chilean Mauers, had no provision to divert or vent powder gases harmlessly out of the action in the event a primer or case head ruptured. In such cases, then, these actions will permit gases to enter the bolt through the firing pin hole, rush back along the striker and mainspring and spray them, and some oil picked up along the way, at the shooter's face. Gases escaping past the unrecused part of the bolt face will be directed backward, down the left locking lug raceway, toward the shooter's face despite the bolt stop lug and flared bolt sleeve. Some M93 Spanish Mauers, notably the ones made in Spain by Industrias de Cataluna, have a single gas escape vent hole in the bolt near the rear bottom edge of the

left locking lug, matching an oblong hole in the receiver ring. These vented actions are safer, but the one small hole is not likely to vent all the escaping gas from a serious case head rupture, and some may still be directed to the shooter's face.

The bolt-stop is attached and hinged to the left of the receiver bridge by a pointed screw passing through the bolt-stop and an integral square lug on the receiver. A stud, on the end of the bolt-stop, protrudes through a hole into the locking lug raceway and halts the rearward travel of the bolt when it contacts the locking lug. This stud is slotted for the ejector, housed partially within the bolt-stop, and held in place by the bolt-stop screw. A double-leaf flat spring, mortised into the bolt-stop housing, holds the bolt-stop against the receiver and keeps the ejector pivoted against the bolt body.

The sear is attached to, and pivots on a pin through a stud on the bottom of the receiver. The trigger pivots on a pin in the sear to the rear of center. The top of the trigger, which bears against the receiver, has two humps which provide the double-stage let-off. The sear and trigger are tensioned by a coil spring between the front of the sear and receiver. Just ahead of the trigger spring, a pin pressed into the sear projects through a hole into the receiver. There is a single, narrow groove cut into the bolt body that aligns with the point of the pin only when the bolt is completely closed, otherwise the bolt body prevents the sear being released. There is also a flat spot on the bottom of the bolt which positions over the pin when the bolt handle is raised, and when the bolt is closed until the cocking cam contacts the sear. This allows the trigger to be pulled back, lowering the firing pin as the bolt is closed.

The cartridge guide lips are milled integral with the magazine well opening in the



Top view of Model 93 Spanish Mauers action.

receiver. These guide lips, one at each side of the magazine well, hold the staggered column of cartridges in the magazine until pushed forward from the magazine by the bolt, and they guide the bullet point into the chamber.

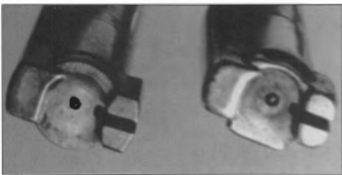
The magazine box and trigger guard are of one-piece, machined-steel construction, with the open top of the magazine box matching the magazine well in the receiver. The receiver and barrel are held securely in the stock via two heavy guard screws going through the front and rear ends of the magazine/guard. The front guard screw threads into the recoil lug, the rear screw into the end of the tang. Many post-1898 rifles have lock screws to prevent the guard screws from turning. The magazine/guard is securely held in alignment with the receiver by a stud collar toward the front overlapping a matching stud extending from the bottom of the recoil lug.

A longitudinal rib, to the left on the top of the milled steel follower, causes the cartridges to be staggered in the magazine. A W-shaped follower spring, held by undercuts in the bottom of the follower and inside the floorplate, provides the upward pressure to the follower. The detachable magazine floorplate is held in position by lips at both ends engaging recesses cut into the magazine/guard. A spring-loaded plunger, at the rear of the magazine box, acts as the floorplate catch to lock it forward. Depressing this catch with a pointed tool through the hole in the rear of the floorplate allows the plate to move back, and carry the follower and follower spring with it free of the action.

Model 93 or 95?

For all practical purposes the M93 and M95 Mauser actions can be considered the same. In fact, an early Mauser catalog describing them makes no distinction. They are listed under the subheading MAUSER MODEL 93-95 with a single description. There are, however, variations by which one may determine their correct designation, or identify them positively by markings on these actions. If an action is marked "Model 1893" or "Model 1895," as in the case of the Chilean M95, there is no question about the correct designation.

When first made, the M93 bolt had two slight bolt face projections forming a small flat spot under the bolt, clearly shown elsewhere in this chapter. The tang and the rear of the receiver, as well as the loading ramp, were cut accordingly to allow passage of the bolt. These small projections permitted more of the bolt head surface to contact the cartridge heads when feeding them from the magazine into the chamber. Later on, however, this feature was dropped—it was found to be unnecessary for proper feeding—and the bolt was



Faces of the M95 (left) and M93 (right) Mauser bolts. Note the flat spot on the bottom of the Model 93 bolt.

then made round. Actions having this later type round bolt head, and otherwise unmarked, can be either M93a or M95s. M93 bolts with flat-bottom bolt heads are not interchangeable in receivers made for the round-headed bolts.

The M95 Chilean Action

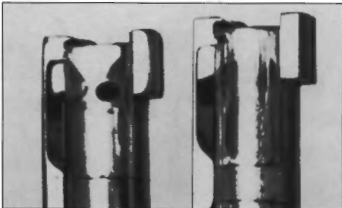
The M95 Chilean action is almost identical in every detail to the regular M95 Spanish action, except that it has a third, or safety, locking lug. This lug, about .175" high, .125" wide and .540" long, is located on the right side of the tang just behind the bolt handle root. This lug does not contact the bolt handle, but is designated to leave a visible gap between it and the bolt handle. Its purpose is not to help hold the bolt locked in the receiver, but to act as a safety measure. That is, if the forward dual-locking lugs should fail

when the rifle is fired, the small safety lug behind the bolt handle would halt or retard the rearward movement of the bolt. In such an extremely rare event the safety lug would afford some protection to the shooter by preventing the bolt from striking his head. It is in this respect only that the M95 Chilean action is somewhat safer than the other pre-98 actions. In my opinion, however, this feature does not make the action any more suitable for high-intensity cartridges.

Other Variations

Earlier in this chapter the M93 Spanish action, made in Spain by Industrias de Guerra, was mentioned as having a gas escape vent in the bolt and receiver. This particular action further differs from the usual M93 and M95 in that the magazine/guard has a hinged floorplate. The floorplate is hinged

Bottom of the M95 bolt (right) as compared with the M93 bolt (left). Note gas escape vent near M93 bolt head.



at the front on a pin and is held closed by a small spring-loaded latch—fitted into a hole at the upper front of the trigger guard bow. Pushing the small plunger of this latch to the left, with a bullet tip or pointed tool, releases the floorplate so it, along with the follower and follower spring, can be swung down to empty the magazine. On others of the same make, a different latch was used. A release lever similar to that used on the Japanese Type 38 caliber 6.5mm rifle is located inside the front curve of the trigger guard bow, and depressing the button releases the floorplate.

Another distinct variation is found on M93 Turkish rifles in 7.65mm caliber. This action has a magazine cutoff—a thumb-operated lever, pivoted on the right side of the receiver. When the cutoff is engaged, it forces the cartridges in the magazine down so the bolt can be closed without picking up a cartridge. To lower a full magazine of cartridges, a deeper floorplate was used on this rifle.

Most M93 Spanish Mausers were made with a magazine follower, square at the rear, which blocked the forward movement of the bolt when the magazine was empty. This feature prevented "blind loading" of the rifle. After ejecting the last case, the bolt will not close, indicating an empty magazine. Other military rifles based on the M93 action, like the M94 Brazilian and the M95 Chilean, had the follower sloped at the rear so the bolt would close when the magazine was empty.

Some M93s and M95s have a deep thumb notch cut into the left receiver wall just

ahead of the bridge—an aid in loading the rifle from a stripper clip. The notch is frequently as deep as that found on the M98 action. On others, the thumb notch will be very shallow, just the top edge of the locking lug raceway cut away and rounded. Another type, like the M95 Chilean Mauser, shows no left wall cut at all.

Model 93 and 96 Rifles

I will list here a few of the variant rifles and carbines based on M93 and M95 Mauser actions. Foremost were the M93 Spanish rifle with 29.06" barrel, weight about 9 pounds; the M93 Spanish short rifle with a 21.75" barrel, weight about 8.3 pounds, and the M95 Spanish carbine with a 17.56" barrel, weight about 7.5 pounds. Many of these Spanish rifles and carbines were made in Germany—Ludwig Loewe & Company, Berlin, made about 250,000; the Mauser firm made 30,000. A great many of these arms were made at the Fabrica de Armas arsenal in Oviedo, Spain, and a huge number of the short rifles were produced by Industrias de Guerra de Cataluna arsenal, also in Spain. The Spanish arsenals made these rifles for many years and I have seen some dated after WWI.

Perhaps the next most common rifle using this action is the M95 Chilean. It carries a 29.06" barrel and weighs about 9 pounds. Like the Spanish M93s and M95s, it is chambered for the 7mm Mauser cartridge.

Century Arms has Chilean M95 Mausers with "OVS" over the serial number (left side

of the receiver ring). These were originally sold to Orange Free State, Africa, but a portion were not paid for or were refused—for whatever reason. These were then engraved (?) with the Chilean coat of arms on top of the receiver ring and sold to Chile.

Rarer, and not as well known, are the M93 Turkish caliber 7.65mm rifle with a 29.06" barrel, the Brazilian M94 in 7mm caliber with 29.06" barrel and the Orange Free State M95, which is similar to the Brazilian M94. Other countries which also adopted the M95 Mauser were Mexico, Uruguay and Persia (Iran).

The Mauser firm made over 200,000 of the Turkish M93 rifles. Ludwig Loewe & Company (Germany) and Fabrique Nationale (FN) of Belgium produced rifles for Brazil.

M94 and M96 Swedish Mausers

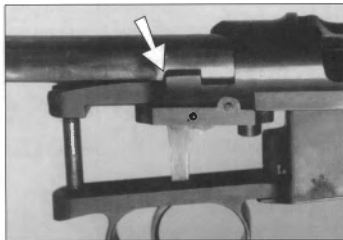
By the time Spain had adopted the M93 Mauser in 1893, Paul Mauser was making further changes to improve it and obtain contracts from other countries. In 1894, Sweden adopted a carbine with these improvements, designated the Model 94 Swedish Mauser Carbine. The new cartridge introduced with this carbine was the 6.5x55mm, which eventually became famous for its long-range accuracy, both as a military and target round.

The Swedish government ordered 12,185 of these carbines, during 1894 and 1895, to be made by Mauser Werke in Germany. Later, the M94 carbines were made by Carl Gustafs Stads Gevarsfabrik (the Swedish government arsenal) in Eskilstuna, Sweden.

Being made for a different cartridge, having a slightly larger body and head diameter than the 7mm, the M94 Swedish action differed from the M93 and M95 actions in that the cocking piece had an upright projection at the end, the top checkered. The true purpose of this feature is not known, but most likely it was meant to unclock the action manually: that is, a way to hold the cocking piece so that, on pulling the trigger, the striker could be lowered or uncocked. It is almost impossible to cock the striker by pulling the checkered projection. Hence, its purpose must have been to unclock the action rather than to cock it, if it had any purpose at all.

Just ahead of this checkered projection there is a notch which allows the safety to be swung over when the striker is down. Like most other bolt actions, when the M94 firing pin is forward and the bolt closed, the firing pin tip protrudes from the face of the bolt. If the safety is swung over to the right, engaging this extra notch in the cocking piece, the firing pin is pulled back within the bolt and locked there. It may have been that this feature, plus the checkered projection on the cocking piece, allowed the soldier to unclock a loaded rifle (with a cartridge chambered) and then engage the safety; thereafter, an accidental blow to

The safety lug (arrow) on the Chilean M95 action is located on the tang just behind the bolt handle base. The lug is about .175" high, .125" wide and .540" long. It does not (and should not) contact the base of the bolt handle.



PART I: Military Rifles & Actions



M94 Swedish Mauser bolt face.



M94 Swedish action is cocked, showing the thumb-piece projection and extra cocking-piece notch.

the cocking piece would not discharge the rifle. With the safety engaged on the uncocked action, the bolt is locked closed.

In 1896, Sweden adopted a rifle called the Model 96 Swedish Mauser, based on the M94 action, but made with an important additional feature. The early M94 Swedish action only had a shallow cut for the thumb in the left receiver wall, and this was found to have insufficient thumb clearance when charging the magazine with a stripper clip. On the M96, the thumb notch was made much deeper, extending through the left locking lug raceway. Therefore, to prevent the left locking from striking the edges of this notch as the bolt was operated, and to keep the bolt from binding, the bolt body was made with a narrow guide rib which passed through a matching groove cut inside the receiver bridge.

In addition to the deep thumb notch and guide rib, the M96 bolt had more gas escape holes. One small hole was located behind the extractor collar, directing any escaping gases to the left and into the lug raceway. A second hole is forward of extractor collar, visible when the bolt is locked, just behind the receiver ring above the extractor. Another smaller hole was bored through the front of the extractor under the extractor hook. The

gas escape holes made these Swedish actions safer than any of the other pre-98 Mausers.

The M96 Swedish Mauser retained the checkered projection and the uncocked safety notch features of the M94 Swedish action. All M94s made after the introduction of the M96 were made with the deep thumb notch, guide rib and gas escape holes. Since few early M94 Swedish carbines were made, they are very scarce and seldom encountered, therefore, M94 and M96 actions usually seen are alike in practically every detail. The only noticeable difference is that the M94 bolt handle is bent down, while on the M96 it sticks straight out to the side. The M94 and M96 actions are like the M93 and M95 actions in most other respects.

Besides the M94 Swedish carbine, in Mauser plant at Oberndorf (Germany) made many of the M96 Swedish rifles. In 1899, for example, they were given a contract to make 45,000 M96 rifles.

A great many more of both the M94s and M96s were made in Sweden by Carl Gustafs firm, and they continued to produce them for many years—I have seen them dated as late as the early 1940s.

In 1938, Sweden adopted a shorter barreled version of the M96 rifle, namely the M38

Swedish Short Rifle. In 1941, they introduced the Model 41 Sniper Rifle, simply a M96 rifle selected for accuracy and with a high, side-mounted telescope fitted to the receiver. The actions of both the M38 rifle and the M41 were the same as the M96, except for the turned-down bolt handle of the M41.

M94 and M96 Swedish actions are readily identified by the checkered projecting lug on the cocking piece. The early M94s will not have the guide rib on the bolt, but all M94s will have the bent bolt handle.

Markings

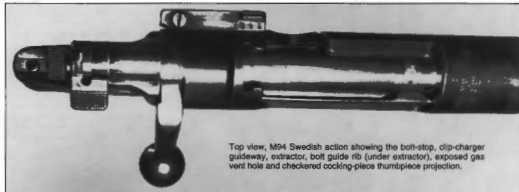
Mauser actions made in Germany are stamped on the receiver thus:

MAUSER OBERNDORF

Those made in Sweden are stamped on the receiver ring with a date (year) as follows:

CARL GUSTAFS
STADSGEVARSAKTOR

Both the German- and Swedish-made actions will have their major parts numbered, and only if all the numbers of the action match can it be considered original. The full



Top view, M94 Swedish action showing the bolt-stop, clip-charger guideway, extractor, bolt guide rib (under extractor), exposed gas vent hole and checkered cocking-piece thumbpiece projection.



M93 Spanish action with hinged floorplate magazine box as made by Industrias de Guerra de Cataluna arsenal.

serial number is on the receiver, and the smaller parts usually carry only the last two or three digits of the entire number. This numbering practice was generally followed by all makers of the M93 and M95 actions.

Interarms of Alexandria, Va., imported many M94 and M96 Swedish Mausers into the U.S. after WWII. For some reason the receiver of most M94s imported by them were remarked with

INTERARMCO G33/50.

Takedown and Assembly

The following procedures apply to all models described in this chapter. To remove the bolt, raise the bolt handle, draw the bolt back, swing out the bolt-stop and pull the bolt from the receiver. To remove the firing mechanism from the bolt, first close the bolt and place the safety in its upright position, then remove the

bolt from the receiver. Unscrew (counterclockwise) the bolt sleeve from the bolt. Place the firing pin tip on a hard surface and, firmly grasping the bolt sleeve, push it down; turn the cocking piece one-quarter turn in either direction and lift it off the firing pin. The striker and mainspring can now be removed. Swing the safety to the right and pull it from the bolt sleeve. Remove the extractor on the M93 by turning it to the top of the bolt and push it forward, off the bolt. Remove the extractor on the others by turning it to the bottom of the bolt before pushing it forward, which releases it from the collar. The collar can be spread apart to remove it from the bolt body but do not remove it unless absolutely necessary. Reassemble the bolt in reverse order.

Remove the magazine floorplate by depressing the floorplate catch with a pointed tool, moving it to the rear until it is released. Slip the follower spring off the follower and

the floorplate. To remove the action from the stock take out front and rear guard screws, lift the barrel and action from the stock and then pull out the magazine/guard. Drive out the sear pin and remove sear, trigger and trigger spring from the receiver. Drive out trigger pin to remove the trigger from the sear. Turn out the bolt-stop screw and remove bolt-stop from the receiver. Pull the ejector forward and out of the bolt-stop housing. Hold the bolt-stop housing in a vise by its lug and, using a drift punch, drive the bolt-stop spring forward until the end of it snaps inside the housing. Insert a sharp narrow screwdriver blade between the end of the spring and the housing and pry it back until it is free. Reassemble these parts in reverse order.

The barrel is threaded (right-hand) very tightly into the receiver and should not be removed unless necessary, and then only if proper tools are available.

Evaluation

The M93 and M95 Mauser actions (including the M95 Chilean) made in Germany by Loewe in Berlin and by Mauser in Obendorf, show the highest quality of workmanship. They are extremely well made and finished. All the parts show careful machining and polishing. Without question, they were made of the finest and most suitable steels for the various parts. These were properly heat-treated and tempered for maximum strength and safety the action design allowed. On most of these actions the receiver and magazine/guard parts were finished a rich blue, while the bolt and all attached parts were left bright. The same praise would certainly apply to the German-made M94 and M96 Swedish actions.

As a general rule, the Spanish M93 and M95 actions made in the Oviedo and Industrias de Guerra arsenals are not as well machined or finished as their German counterparts. It is assumed that the Spanish actions conformed to the same general specifications as the German actions, and it is probable that similar steels and heat treating methods were also used in their manufacture. Since this is likely, the Spanish-made actions should be as strong and as safe as the German ones—though the latter actions are always preferred.

Of all pre-98 Mauser actions, the Swedish-made M94s and M96s are considered the best. Some experts believe that the Swedes used a better steel for their bolts and receivers. This may well be true for the high quality of "Swedish steel" is well known. Their actions were also as well made and finished as the German actions. The Swedish-made actions were proofed with loads developing up to 66,000 psi breech pressure. I don't think Swedish actions are actually stronger than any of the other M93 or M95 Mauser actions, but they are safer because of the gas-venting holes.



Another version of the M93 Mauser. The hinged magazine floorplate (shown open) has a release lever at the front of the trigger guard bow.



Chilean M95 action. The original bolt has been altered to a forged low-contour bolt handle.

The firing pin can be lowered to the uncocked position on all of these actions by pushing the opened bolt forward and holding the trigger back while turning the bolt closed. Of course, this should only be done on an empty chamber.

Remodeling and Rebarreling

Any of these actions can be used to build a sporting rifle with a minimum of remodeling required. If a scope is to be mounted low over the receiver, the bolt handle must be altered to clear the scope. I recommend cutting off the original bolt handle and electrically welding a new forged one to the bolt body. Alter the bolt on the M95 Chilean so that the base of the bolt clears the safety lug on the receiver just as the original bolt did. Otherwise, the problem of altering the bolt handle, or welding on a new one, requires no more work than the M98 Mauser.

Commercially made low safeties are available for these rifles, eliminating alteration of the original. Attachments to eliminate the double-stage trigger pull are made, but it's a much better idea to install a commercially-made, adjustable, single-stage trigger mechanism in these actions if you dislike the military pull.

All receiver sights made for the M98 Mauser action will also fit any of these actions. Most scope mounts made for the small ring M98 can be used. Of course, installing a receiver sight or scope mount requires that holes be drilled and tapped in the receiver. For actions which have the crest ground from the top of the receiver, I would suggest using a side mount instead of a top mount for the scope.

One of the main objections to pre-98 Mauser actions is their long striker fall and slow lock time. Most shooters also object to the cock-on-closing design of these actions.

Actually, neither feature is so objectionable that they require alteration when building a sporting rifle. My suggestion to those insisting on a cock-on-opening action is to start with one already having this feature, rather than going to all the trouble and expense of converting these actions to cock on opening. Yes, this can be done with these actions, but it would not be practicable to attempt it.

When rebarreling any one these actions, I advise limiting the cartridge choice to those originally used, or to other cartridges within the following limits: Any cartridge developing less than 45,000 psi breech pressure, of 30-06 head size, with an overall length less than that of the magazine.

I consider all of these actions, with the possible exception of the M94 and M96 Swedish Mauser actions, as having marginal strength and safety for the 308 Win. (7.62mm NATO) cartridge. I would not recommend any of these actions for the 22-250, 220 Swift, 243, 244 or 6mm Rem., 284 Win. and 358 Win.

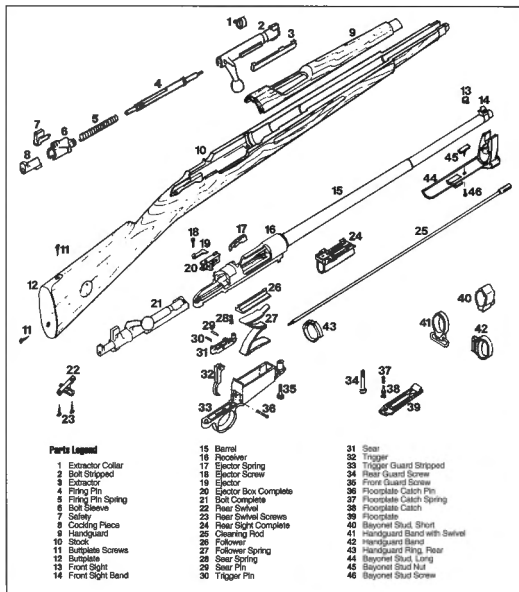
What about the 222, 222 Magnum and 223 Rem. cartridges? I believe these actions would be sufficiently strong and safe for any of them, but there is no practicable way to alter or adapt the magazine or the bolt face for these small cartridges and keep the rifle a repeater. However, the action could be fitted with a 22-caliber centerfire barrel and chambered for the 222 and used as a single shot. This requires lengthening the extractor hook for the smaller cartridge. At best, even as a single shot, these actions are just not too well adapted for cartridges having a head size smaller or larger than the standard 30-06 size.

The 7mm Cartridge

The first "war trophy" M93 Mausers were brought into the United States from Cuba after the Spanish American War, which ended in 1898. Besides proving very



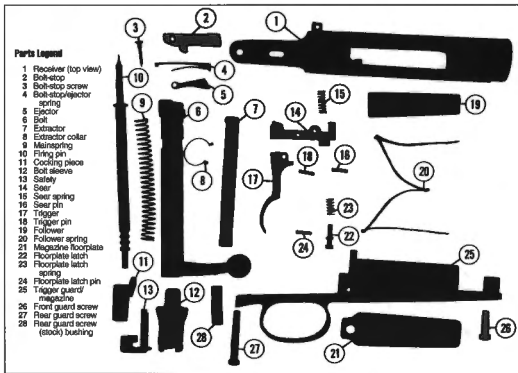
M96 Swedish rifle, 29.1" barrel chambered for the 6.5x55mm Mauser cartridge, 49.5" overall, weight about 9 pounds.



effective militarily, the 7mm was soon established as an excellent sporting cartridge for big game hunting. Almost as soon as the M98 Mauser rifle was introduced and sporting rifles were made on its action, the 7mm caliber was one of its most popular chamberings.

By the turn of the century, these sporting rifles were becoming known to American sportsmen. For many years afterward, the 7mm Mauser cartridge was one of the most "written up" of all foreign cartridges and received nearly as much wordage as the 30-06.

Commonly known as the 7mm Mauser, it is correctly referred to as the 7x57mm Mauser. This designates a case 57mm long and caliber of 7mm (bullet diameter of .284"). It is a rimless bottlenecked cartridge, with much of its long bullet exposed. The typical military round had a 173-grain round-nosed



Mauser Models 83 & 95

Dimensional Action Specifications Model 83 & 95 Mauser

Weight	.....2 lbs., 10 oz.
Length	.....8.375"
Receiver ring dia.	.....1.300"
Bolt body dia.	......700"
Bolt travel	.....4.275"
Striker travel	.....1.00"
Guard screw spacing	.....7.625"
Magazine well width:	
Front	......550"
Rear	......507"
Magazine length	.....3.125"
Bolt face recess:	
Depth	......065"
Dia.	......485"

Models 84 & 96 Swedish Mauser

Bolt face recess (partial):	
Depth	......062"
Dia.	......487"
Magazine length	.....3.235"
Receiver well opening	
Front	......595"
Rear	......484"
*Widest spot, about 1" from the rear of well. Other specifications are about like those of the M93 & M95 actions.	

General Specifications

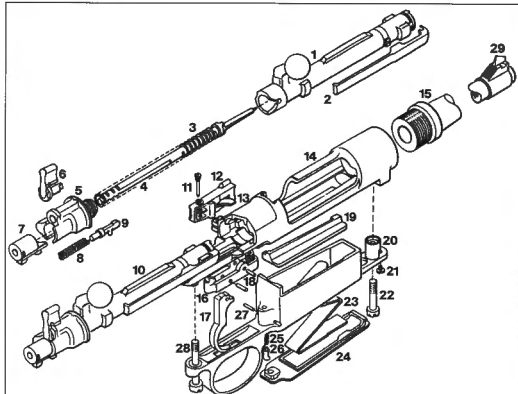
Type	.....Tumbolt repeater.
Receiver	.....One-piece machined steel forging, unslotted bridge. Clip-charger guideway in bridge.
Bolt	.....One-piece, dual-opposed locking lugs forward.
Ignition	.....One-piece firing pin, coil mainspring and cocking piece. Cocks on closing the bolt.
Magazine	.....Staggered column, nondetachable box type. 5-shot capacity. Detachable floorplate. One Spanish-made M93 has hinged floorplate.
Trigger	.....Non-adjustable, double-stage military type.
Safety	.....Rotary wing type built into bolt sleeve. 180° swing from left to right, locks striker when "up," locks striker and bolt when at right.
Extractor	.....One-piece, non-rotating, spring steel. Attached to the bolt by a collar.
Bolt-stop	.....Separate, hinged at left rear of receiver. Stops rearward bolt travel by contacting left locking lug.
Ejector	.....Swinging type, positioned in bolt-stop housing.

jacketed bullet driven at a muzzle velocity of about 2300 fps. Most military rifles chambered for this cartridge have barrels with a rifling twist of one turn in 8.8", and are deeply throated to accept the long bullet.

Commercial 7mm Mauser cartridges loaded in the United States have a 175-grain softpoint bullet with a muzzle velocity of

around 2490 fps. It is loaded to approximately the same overall length, using a bullet that matches the military chamber and rifling perfectly. Ballistically this 7mm load is comparable to the 308 Winchester (180-grain Power Point).

I included the figures and comparison above for a good reason: First, for hunting



Part Legend

- 1 Bolt Body
- 2 Extractor
- 3 Firing Pin Spring
- 4 Firing Pin
- 5 Bolt Sleeve
- 6 Safety Catch
- 7 Cocking Piece
- 8 Bolt Sleeve Stop Spring
- 9 Bolt Sleeve Stop
- 10 Bolt Assembly
- 11 Bolt-stop Screw

- 12 Bolt-stop and Spring
- 13 Ejector
- 14 Receiver
- 15 Barrel
- 16 Seer
- 17 Trigger
- 18 Seer And Trigger Pins
- 19 Magazine Follower
- 20 Trigger Guard
- 21 Lock Screw
- 22 Front Guard Screw
- 23 Magazine Spring
- 24 Floorplate

- 25 Floorplate Latch Spring
- 26 Floorplate Latch
- 27 Floorplate Latch Pin
- 28 Rear Guard Screw
- 29 Front Sight

- Parts Not Shown**
- Bolt Stop
 - Bolt Stop Assembly
 - Bolt Stop Spring
 - Ejector Spring
 - Extractor Collar
 - Seer Spring

game like deer, antelope, black bear, sheep, goats, caribou and elk, the U.S. commercially loaded 7mm cartridge is equal to many of our popular cartridges.

I believe the 7mm will be around for a long time yet. As of 1994, a number of ammunition makers here and abroad load this cartridge, some with several different bullet weights, and most of the large sporting arms makers offer rifles chambered for it.

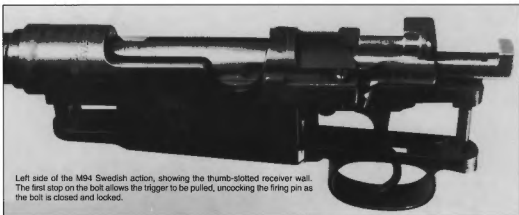
The 7mm Mauser has always been a hand-loaders dream cartridge. This is because there

is such a wide range of domestic bullets available in this caliber. In military rifles the best accuracy will usually be obtained with heavier bullets, those ranging from 139 to 175 grains. Some of the lighter bullets may give fine accuracy if seated very shallowly in the case-neck, for a minimum of jump from case to rifling.

The 6.5 x 55mm Cartridge

If I have praised the 7mm Mauser cartridge, then I should extol the 6.5x55mm

Mauser cartridge as well since it, too, is a renowned performer. It is, in the opinion of many experts, the finest 6.5mm cartridge ever developed. It first proved to be an excellent military cartridge, and later on a better sporting and target cartridge. As a target cartridge, it established some enviable records. Its high esteem is reflected by the fact that it was offered as one chambering for the Remington 40XB target rifle. Therefore, if you have an M94, M96 or M41 Swedish rifle with an excellent bore,



Left side of the M94 Swedish action, showing the thumb-slotted receiver wall. The first stop on the bolt allows the trigger to be pulled, uncocking the firing pin as the bolt is closed and locked.

it would be plumb foolish to rebarrel it in another caliber.

The 6.5x55mm, as loaded by Norma, is available from dealers handling this brand.

Like the 7mm, the heavier-bullet loads perform best in the deep-throated 6.5x55mm military chambered barrels. Using Norma cases it's a good cartridge for the serious hand-loader. The best reloading information on this cartridge is in the *Hornady Handbook of Cartridge Reloading*.

Conclusion

The Swedish rifles discussed in this chapter

were never plentiful. From time to time during the 1950s, some dealers in military surplus offered M94 carbines for about \$30. M96 rifles were offered less frequently, and were usually priced a bit higher. Some M38s were offered, as were the actions, in the late 1950s and again in the early 1990s. Sales apparently were good—for these items were seldom listed after 1960. Surprisingly, however, in 1967 and 1968 a couple of firms offered the M41 Swedish sniper rifle complete with scope and mount for about \$70. While all the Swedish Mauser rifles are becoming more scarce, it usually is not too

difficult to pick one up from dealers handling used firearms.

As for the M93s, they appear to be more common than ever before. Since the military surplus market boom began after WWII, it seems that more of the various M93 carbines and rifles have been offered, as well as M93 actions, than any other foreign arm. I expect this condition to exist for a few years yet, though the supply will diminish eventually. M95 Mausers, especially M95 Chilean rifles, are much more scarce.

A fine custom-made sporter based on the M94 Swedish Mauser action. A 1903 Springfield four-groove barrel is fitted to the action and rechambered to 308. A new bolt handle, Bushier safety and Weaver detachable side mount carrying a K-4 scope were also fitted. The figured walnut stock has skip-line checkering.



M94 Swedish carbine, 6.5x55mm cal., 17.38" barrel, 37.4" overall, weight about 7.3 pounds.



Mauser

Smokeless Powder Actions

Models 88, 89, 90 & 91

PAUL MAUSER MUST surely have been disappointed when his native country adopted the Model 88 Commission rifle in 1888. Although the M88 action contained a number of original Mauser design features, it was not a "Mauser." The Mauser features used in the M88 were those of the blackpowder M71/84 including the non-rotating separate bolt head, ejector, trigger and firing mechanism.

While Germany was considering adoption of the M88, Paul Mauser was busy designing a new action. He tried to improve and strengthen his M71/84 action, and at the same time eliminating the special clip needed to hold the cartridges in the M88 magazine, a poor feature.

Experimental M88

This action was an improved version of the M71/84 Mauser with high receiver walls, double locking lugs engaging recesses in the receiver bridge, and a nine-shot single column box magazine. It was chambered for a new Mauser cartridge, the 7.65mm, a smokeless-powder load. Mauser entered this rifle in the Belgian rifle trials but was not successful in selling it—it remained an experimental model.

Failing with the experimental M88, Paul Mauser designed an entirely new action. A far departure from any of his earlier types, it was the forerunner of the justly famed Model 1898 Mauser. This new and vastly improved action introduced the Mauser locking system for the first time. The one-piece bolt, bored from the rear, had dual-opposed locking lugs on the forward end. The rifle, chambered for the 7.65mm Mauser cartridge, was adopted by Belgium in 1889 and became known as the Model 1889 Belgian Mauser.

The M89 was the first highly successful Mauser action designed for a powerful, smokeless powder, rimless military cartridge. It was also the first Mauser action designed to load the magazine with a charger (more commonly referred to as a stripper clip). This action set the general pattern for other Mauser

tumbolt rifle actions which followed, with changes and improvements that made Mauser actions a standard the world over.

M89 Mauser Rifles

The first Belgian M89s were made in the large Fabrique Nationale (FN) plant in Herstal, Belgium. Originally there were three versions: a rifle with a 30.67" barrel, a carbine with a 21.65" barrel and a shorter carbine with a 15.75" barrel. All of these (plus a carbine to be introduced in 1916) were made with a barrel jacket—essentially like the one used on the M88 Commission rifle. This jacket was a thin-walled steel tube covering the barrel. The rear of the tube threaded on to the front of the receiver ring, with a bushing at its opposite end to center the barrel muzzle. The FN plant made some 275,000 of these rifles and carbines from 1889 to about 1925. A great many more were made in the Belgian government arsenal in Liege. Many were also made in Birmingham, England, at a plant set up and operated by Belgian refugees. Oddly enough, an American firm (Hopkins & Allen of Norwich, Conn.) obtained a contract and made many of these rifles for Belgium a few years before World War I.

Some versions of the Belgian Mauser made after the introduction of the 1890 Turkish and 1891 Argentine Mausers will often have minor improvements found on these later rifles. These improvements will be pointed out in the detailed discussion which follows.

The last version of the M89 Belgian Mauser, the M89/36, does not have the barrel jacket.

None of the M89 Belgian rifles were made by the Mauser plant in Germany. Some of the late M89/36 Belgian rifles were made by Anschütz Pieper in Herstal, and were so marked.

Model 1890 Turkish Rifle

During the development of the M89, Mauser had a contract to make the M87 rifle for Turkey, one based on the M71/84 action.

A clause in the contract provided Turkey with the benefit of any improvements made to the Mauser actions. After more than 200,000 M87s were made, Turkey insisted that the rest of the contract be filled with rifles based on the Model 89 action. Thus Mauser made upward of 280,000 of these M89 rifles (some of which may have been carbines). Designated the Model 1890 Turkish, these rifles had a 29.13" stepped barrel, without barrel jacket, but with a short wooden handguard to cover the top rear of the barrel. The only noticeable change made in the action was a buttress thread used to thread the bolt sleeve in the bolt. These rifles were chambered for the 7.65mm Mauser cartridge, as were the Belgian rifles and carbines. The M90 Turkish rifles are very uncommon today.

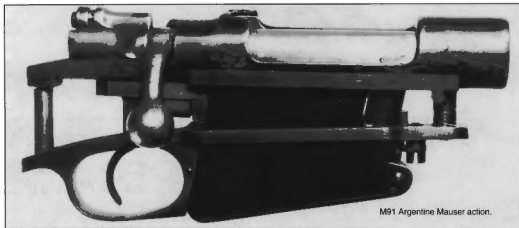
Model 1891 Argentine

In 1891, Argentina adopted a Mauser rifle based on the M89 action. It was designated the Model 1891 Argentine Mauser. The M91 was made with a 29.13" barrel and chambered for the 7.65mm cartridge, a popular military cartridge by this time. M91s had no barrel jacket, but a wooden handguard covered part of the breech end of the barrel. An M91 carbine version had a 17.63" barrel. The principal supplier of these rifles and carbines was Ludwig Loewe & Co., Berlin, who made 180,000 rifles and 30,000 carbines. DWM, of Germany, also made a quantity of the Argentine rifles. Peru, Columbia, Bolivia and Ecuador also adopted the M91 as their military arm.

M91 Spanish Mauser

In 1891 Spain became interested in these new smokeless powder rifles and, mostly for trial purposes, bought about 1800 of them in

(Above) M91 Argentine carbine, caliber 7.65mm Mauser. Barrel is 17.63" long, length 37" overall, weight about 7.2 lbs.



M91 Argentine Mauser action.

caliber 7.65mm. Known as the Spanish Model 91, it was essentially the same as the Turkish M90. Few were made and therefore the M91 Spanish rifle is very scarce today. Spain did adopt the carbine version, almost the same as the M91 Argentine carbine, and since more of these were made, the carbine is more common than the Spanish M91 rifle.

The Spanish M91 Mauser action differs from the Turkish M90 in that it has a small spring built into the right locking lug on the bolt to prevent double loading. The Belgian M89, Turkish M90 and Argentine M91 actions were made without this feature. It is possible, therefore, to double-load those rifles unless the bolt is fully closed and locked when chambering a cartridge.

Normally, in these rifles, the cartridge is pushed into the chamber by the bolt, and not until the bolt is turned down and locked does the extractor slip over the cartridge rim. Therefore, if a cartridge is chambered, and the bolt is not fully closed, on withdrawing the bolt the

cartridge will be left in the chamber. Then, on closing the bolt again it would pick up another cartridge, and its bullet would strike the cartridge already in the chamber. This is not only annoying, but could discharge the chambered cartridge should the pointed bullet strike the primer hard enough. The bolt head recess of the Spanish M91 is so undercut that, on pushing a cartridge from the magazine, the cartridge head slides directly into the bolt face recess, under the extractor hook. Held there under tension by a small spring in the right lug, if the bolt is not fully closed, the cartridge will be extracted and ejected when the bolt is drawn back.

The Actions

As already noted, except for minor differences, the M89 Belgian, M90 Turkish, M91 Argentine and M91 Spanish Mauser actions are essentially alike. I suspect, therefore, that practically all action parts are more or less interchangeable. At any rate, all of them were

made for the 7.65mm Mauser cartridge. Since the M91 Argentine rifles and actions appear to be the most common, I have chosen this action to describe in detail. The description following applies to the other actions as well—except for the few differences already mentioned or to be noted later on.

The one-piece receiver is a machined steel forging. The recoil lug, integral with the receiver, is located about 1.00" back from the front edge of the receiver. The front part of the receiver ring is round. The bottom of the receiver, from the recoil lug to the rear of the magazine, is flat. The magazine well opening is milled in the center of this flat area. The receiver ring is threaded inside to accept the barrel shank. The barrel has a short shoulder that butts against the front of the receiver when the barrel is tightened. The M89 Belgian rifles with the barrel jackets have about $\frac{1}{32}$ " of the front outside of the receiver threaded for the barrel jacket collar.



M91 Mauser action with bolt open.

The receiver is the same width from receiver ring to bridge, making the left side of the receiver ring, side wall and bridge a smooth, rounded surface. The front part (about $1/2$ " of the bridge is the same diameter as the receiver ring. A rectangular notch, milled into this part, forms the charger guideways. The rest of the bridge is milled thinner to reduce weight. The receiver ends in a tang about 2.3" long.

The one-piece machined bolt has dual-opposed locking lugs on its forward end. These engage matching recesses in the receiver ring and hold the bolt locked against the barrel when the action is closed. The right (or bottom) locking lug is solid, while the left (or top) locking lug is slotted to allow the ejector to pass.

The bolt face is recessed to a depth of about .120". Except for a shallow notch in the bottom of the bolt face, narrow extractor and ejector slots, the cartridge head is surrounded by a ring of steel when the bolt is closed.

The extractor is a thin piece of spring steel about 1.460" long with a small hook on its front end to engage the cartridge rim. It is fitted into a slot and dovetail mortise, cut lengthwise



M91 Mauser bolt face.

in the head of the bolt body. Held in place in its recess by the dovetail mortise, the extractor is prevented from moving forward by a lip under its forward end, engaging a cut in the bolt head. On closing the bolt with cartridge in the chamber the extractor snaps easily over the cartridge rim.

There is a small stud (pin) pressed into a hole in the right receiver ring locking recess. When the bolt is fully closed, this stud coincides with the hook end of the extractor. Its purpose is to support the end of the extractor and prevent it from springing too far should powder gases escape in the extractor area. Thus, with the bolt closed and locked, the extractor hook becomes part of the supporting rim around the cartridge head.

The bolt handle, an integral part of the bolt body, has a short square base, a slender round shank and a round ball grasping handle. On most of the rifles the bolt handle is straight, while on the carbines it is generally bent down.

Primary extraction power is achieved on opening the bolt—the base of the bolt handle contacts and moves over an inclined surface on the left rear edge of the receiver bridge.

The bolt body is drilled from the rear to accept the firing mechanism. The coil mainspring is compressed over the stem of the firing pin, between the shoulder on the firing pin and the forward, threaded shank of the bolt sleeve. The rear of the firing pin extends through the bolt sleeve and is held in place by the cocking piece, threaded to the firing pin. The unit is retained in position by the bolt sleeve, being threaded into the rear of the bolt body. A small rib on the firing pin and a matching groove in the bolt sleeve, through which the firing pin moves, prevents the firing pin from turning in the cocking piece. This rib is of such length that in assembling the firing pin parts, the cocking piece is turned on just far enough for correct firing pin protrusion when the cocking piece is threaded against the rib.

There are two notches at the rear of the bolt into which the cam or sear of the cocking piece can fall. A deep notch coincides with the cam on the cocking piece when the bolt is fully closed and locked, allowing the firing pin to move forward under mainspring tension for proper firing pin protrusion and ignition. On raising the bolt handle, the inclined surface of this deep notch moves the cocking piece, firing pin, and firing pin tip back within the bolt face. When the bolt handle is fully raised the cam on the cocking piece falls in the shallow notch. In this second position, the firing pin tip is still within the bolt face and prevents easy turning of the bolt sleeve when the bolt is drawn back. The rifle cannot be fired unless the bolt is closed enough to allow the cocking piece to fall within the deep notch; in which case, the locking lugs are engaged in the receiver and lock the bolt closed.

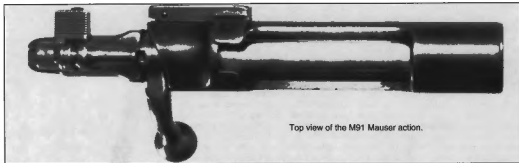
No provision is made to block the sear when the bolt is not fully locked. The action is cocked on the bolt's final closing motion—the sear engages the cocking piece and holds it back when the bolt is closed. The firing pin can be lowered, without snapping the action, by holding the trigger back as the action is closed.

The wing-type safety is fitted lengthwise into a hole at the top of the bolt sleeve. A small spring-loaded plunger in the safety wing engages a shallow groove in the bolt sleeve, holding the safety in place; shallow detents at either end of the groove provide the "off" and "on" safety positions. Swung to the left, the safety is disengaged, allowing the action to be operated. When the action is closed and the firing pin cocked, swinging the safety to the vertical or to the far right position locks the bolt closed, so it cannot be opened, and holds the cocking piece from contact with the sear. The safety can also be swung to the right, when the firing pin is uncocked, to lock the bolt.



M91 Argentine Mauser rifle, caliber 7.65mm Mauser. This rifle has a 29.1" barrel, length 48.6" overall, weight about 8.8 lbs.

PART I: Military Rifles & Actions



Top view of the M91 Mauser action.

The sturdy box-like bolt-stop is hinged to the rear left side of the receiver on a stud and pin. A projection on the bolt stop extends through a hole in the receiver and, on opening the bolt, its travel is stopped when the left locking lug contacts this projection. Swinging the bolt stop outward manually allows the bolt to be removed. The thin ejector extends into the receiver through a narrow slot. It is housed in the bolt-stop and pivots on the bolt-stop pin. The bolt-stop is tensioned by a sturdy flat spring, mortised in the bolt-stop housing and bearing against the top surface of the square bolt-stop stud. This spring keeps the bolt-stop closed and against the receiver. The small flat ejector spring, dovetailed inside the bolt-stop housing, contacts the ejector to keep it against the bolt body. A small screw, through the rear end of the bolt-stop spring, holds it and the ejector spring in place.

The bolt-stop is made with a long lip curving upward at its forward end. The end of this lip extends slightly past the left edge of the clip charger guideway. The end of the bolt-stop lip holds the special stripper clip in place.

The lip, of course, is also the means by which the bolt-stop can be swung outwards so the bolt can be removed.

The sear is attached to the underside of the receiver and pivots on a small pin. Tension is provided by a coil spring within the sear. The trigger is of the double-pull type and is pivoted to the sear on a pin.

The trigger guard is combined with the magazine plate through which the detachable box magazine enters. Two guard screws, one on each end of the trigger guard, thread into the recoil lug and tang, holding the action securely in the stock.

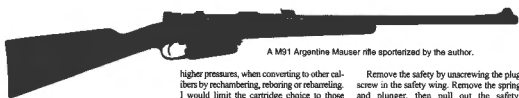
The single column, five-shot box magazine is extremely well made, with thin sides of spring steel. The top edges of the sides are bent inward slightly to hold the cartridges in place, but can spring outward when cartridges are inserted. The jointed-V follower pivots at the bottom front corner of the magazine box on a screw. This screw also holds the bottom plate of the magazine in place along with a pin (riveted in place and not easily removed) at the rear of the box. Two leaf springs, grooved in place,

one each in the bottom plate and lower follower arm, tension the follower to raise cartridges in the magazine. The magazine is guided, and precisely positioned in the action, by a hole in the trigger guard and the guide extension at the bottom of the receiver when the sear is pivoted. A spring-loaded latch, in the front of the trigger guard bow, holds the magazine in place. The magazine, not intended to be quickly detachable, can be removed, however, by depressing the latch with a pointed tool or bullet point, through the trigger guard bow, and pulling down on the magazine. On the M91 Argentine Mausers, the magazine is fastened in front by a coin-slotted, lipped stud. It is riveted into the trigger guard with the lip of the stud engaging a slot at the front of the magazine.

The magazine is normally loaded while it is in the action. With the bolt open, the magazine can be loaded through the top of the action by using a stripper clip or loaded singly by pressing the cartridges directly into the magazine. The magazine could be removed from the action, loaded, and reinserted into the action, but removing the magazine is not



Left side of the M91 Argentine Mauser action.



A M91 Argentine Mauser rifle sporterized by the author.

easily done without a tool to depress the magazine catch.

All of the Belgian and German M89, 90 and 91 Mauser rifles and carbines I've seen were superbly made and finished. There were no short cuts, crude stampings or soft alloys used in their manufacture. All of the action parts are precisely machined and well finished. I would assume that such vital parts of the action as the receiver, bolt, extractor, firing pin, etc. were made of the best steels available and suitable for these parts, and that they were properly heat treated.

Markings

The serial number, or a part of that number, is stamped on all major parts of these actions. If these numbers match, it can be assumed that all the parts are original. Some parts are proof marked as well. The model designation and the name of the manufacturer is usually stamped on the left side of the receiver. The crest of the government for whom these arms were made was usually stamped on top of the receiver ring, but in many cases this identification was ground off before the arms were sold as surplus.

The 7.65mm Cartridge

All of these arms were chambered for the 7.65mm Mauser cartridge, very popular in years past. It was and is an excellent military and sporting cartridge. With a 150-grain semi-pointed softpoint bullet it has an advertised muzzle velocity of 2920 fps. This places it in a power velocity class between the 308 Win. and 30-06. Therefore, if you have one of these rifles with an excellent bore and want to use it, I'd suggest using its present caliber. The 7.65 cartridge is well designed, and it can be handloaded easily.

Action Strength and Safety

I would judge these actions to be as strong and safe as any other pre-98 Mauser action—the M93 and M95. These actions have no "safety" or "third" locking lug. No provision is made to vent escaping powder gases harmlessly from the action, in the event of a case or primer failure. However, the deeply recessed bolt head and narrow extractor slot actually provide more cartridge head support and coverage than do any of the later Mauser actions—including the Model 98. Nevertheless, though these actions may have been proofed at much

higher pressures, when converting to other calibers by rechambering, rebarreling or rebarreling. I would limit the cartridge choice to those developing less than 45,000 psi. The magazine, bolt head and extractor, as well as the chamber and bore, impose other limitations on the choice of cartridges suitable for this action, which largely limits any conversion to rebarreling only. By rebarreling, the M89, 90 and 91 Mauser actions would be suitable for the following cartridges, none requiring any action changes to be made: 250-3000 Savage, 257 Roberts, 6.5mm Mauser, 7mm Mauser, 300 Savage and 35 Remington.

Consolidating Tips

The receivers of the M89, 90 and 91 Mausers are of the same general size, length and contour as the M93, 94, 95 and 96 Mausers; any scope mount suitable for the latter group can be used on the former.

Receiver sights made for the M98 are correct for the M89, 90 and 91. When mounting a scope low and over the bore, it is necessary to alter the bolt handle to clear the scope. The same procedure is followed as when altering any other bolt handle. I recommend cutting off the original handle and electrically welding on a new one. Maynard Buehler makes a low scope safety for these actions. I don't know of any practical way to rework the action to make the bolt cock on opening, nor a way to alter the magazine to be flush with the stock. I can only suggest, if you use one of these actions, that you accept these limitations, including the long striker fall. When using the M89 Belgian action fitted with a barrel sleeve, I would discard the jacket. However, you can use the collar from this jacket to cover up the threads on the receiver ring by turning the collar on tightly and dressing it flush with the front end of the receiver. You should be able to purchase a semi-integrated and shaped stock from one of several commercial stock makers.

Takedown and Assembly

To disassemble the Model 89, 90 or 91 Mauser action, proceed as follows: Remove the bolt by swinging the bolt-stop to the left and pulling the bolt to the rear. To remove the firing mechanism from the bolt, pull the cocking piece back slightly with a small tool and unscrew the bolt sleeve from the bolt. Grasp the bolt sleeve firmly in one hand and, resting the firing pin tip on a hard surface, push the bolt sleeve down to compress the mainspring. Then unscrew the cocking piece from the firing pin.

Remove the safety by unscrewing the plug screw in the safety wing. Remove the spring and plunger, then pull out the safety. Reassemble in reverse order.

Remove the extractor by inserting a small screwdriver under the extractor hook, pushing the hook outward, and at the same time prying the extractor forward until the lip on the extractor clears its recess. Reassemble in reverse order.

Remove the magazine by unlocking the forward magazine lock stud and depressing the magazine latch in the trigger guard with a pointed tool. Pull out the magazine. Disassemble the magazine by removing the exposed magazine follower pivot screw, allowing the magazine plate to swing down and remove the follower. Do not attempt to remove the bottom plate entirely—the small hinge pin is riveted in place. To reassemble the magazine, insert the follower and partially insert the follower screw. Swing the bottom plate into place and turn the screw tight.

To remove the receiver, barrel and trigger guard from the stock, first remove the barrel bands, then both guard screws and lift these parts from the wood.

Remove the sear and trigger by driving out their retaining pins. Remove the bolt-stop by driving out its pin. Bolt-stop and ejector springs are held by the bolt-stop spring screw; remove it and drive each spring rearward from the bolt-stop housing. The ejector comes out of the bolt-stop without removing the springs, by pulling it forward.

Remove the magazine latch by driving out the latch pin. Reassemble all of these parts in reverse order. Do not unscrew the barrel from the receiver unless proper tools are available to do this correctly.

Conclusion

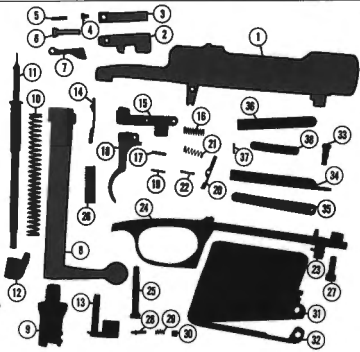
Here are some questions I've been asked many times about these rifles and actions: How many of the M89, 90 and 91 Mauser rifles were made? Answer: All told, a great many. I don't have any exact figures, but if the known quantities given in the first part of this chapter are totaled, there must have been over a half-million of the M89s made for Belgium, and about the same number of the M90s and 91s made for Turkey and Argentina combined.

Do you consider these actions as being suitable for cartridges like the 22-250, 243, 6mm, 308, and 358? Answer: No, I do not. These are all modern high-intensity cartridges, and should be restricted to stronger and safer actions. I don't mean to imply that a

PART I: Military Rifles & Actions

Parts Legend

- 1 Receiver (side view)
- 2 Bolt-stop
- 3 Bolt-stop spring
- 4 Bolt-stop spring screw
- 5 Bolt-stop pin
- 6 Ejector spring
- 7 Ejector
- 8 Bolt
- 9 Bolt sleeve
- 10 Mainspring
- 11 Firing pin
- 12 Cocking piece
- 13 Safety
- 14 Extractor
- 15 Seer
- 16 Seer spring
- 17 Seer pin
- 18 Trigger
- 19 Trigger pin
- 20 Magazine latch
- 21 Magazine latch spring
- 22 Magazine latch pin
- 23 Magazine lock stud
- 24 Trigger guard
- 25 Rear guard screw
- 26 Rear guard screw sleeve (stock bushing)
- 27 Front guard screw
- 28 Safety plunger
- 29 Safety plunger spring
- 30 Safety plunger cap screw
- 31 Magazine box
- 32 Magazine plate
- 33 Magazine plate follower arm screw
- 34 Magazine follower arm
- 35 Magazine follower arm spring
- 36 Magazine follower
- 37 Magazine follower pin
- 38 Magazine follower spring



Mauser M91

Dimensional Action Specifications

Weight	2.75 lbs.
Length	8.312"
Receiver ring dia.	1.300"
Bolt body dia.	1.700"
Bolt travel	4.100"
Striker travel	1.100"
Guard screw spacing	7.062"
Magazine well:	
Width	.475"
Length	3.110"
Box magazine opening:	
Width	3.65"
Length	3.100"
Bolt face recess:	
Depth	.120"
Dia.	.475"

General Specifications

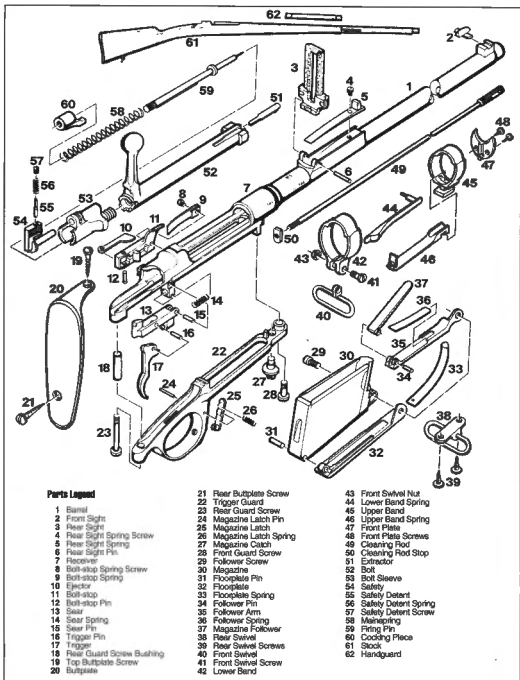
Type	Tumbolt repeater.
Receiver	One-piece machined steel forging, unslotted bridge. Clip charger guideways in bridge.
Bolt	One-piece, dual-opposed forward locking lugs.
Ignition	One-piece firing pin, cocking piece and coil mainspring. Cocks on closing bolt.
Magazine	Single-column detachable box magazine, 5-shot capacity.
Trigger	Non-adjustable double-stage military type.
Safety	Rotary wing-type built into bolt sleeve. 180° swing, left to right, locks both striker and bolt when "up" or at far-right (horizontal) position.
Extractor	One-piece spring type built into bolt head. Extractor rotates with bolt.
Bolt-stop	Separate, hinged at the left rear of receiver. Stops rearward travel of bolt by contacting left locking lug.
Ejector	Swinging type, positioned in bolt-stop housing.
Magazine cutoff	None provided.

Model 91 Argentine action, for example, would blow up if properly barreled in any one of these calibers. However, in case of a serious primer or case head rupture with a high-intensity cartridge, this action does not offer the shooter the same protection from escaping powder gases and brass particles that a safer action like the M98 Mauser would. In other words, the action may be *strong* enough, but

is it *safe* enough? I know that many gunsmiths do not agree with me on this point, but I prefer to err on the side of safety.

Is it practicable to build a rifle based on one of these actions? Answer: Yes, as a hobby, if you can fit a low-cost barrel to the action and do all the work yourself. No, if you have to hire most or all of the work done, or do the work yourself and expect to sell the rifle at a

profit. It is practicable to sporterize or remodel only if you start with a rifle having an excellent bore and don't change its present caliber. It might be advisable, too, not to consider one of these rifles in excellent or original condition for any alteration or remodeling. Doing this greatly reduces its value as a collector item. This does not apply if the rifle has already been modified or remodeled.





Mauser— Siamese Mauser

IN HIS EXCELLENT book *Mauser Bolt Rifles*, Ludwig E. Olson describes so many different models, variations and styles of Mauser turnbolt rifles that scanning the index never ceases to amaze and baffle me. Many of these are described in some detail, but the one listed as “8-mm Mauser, Siam,” (on page 126 in my copy of this book) has but one short paragraph, another short note about the 8mm rimmed cartridge it fired, and that’s all. This is understandable for these rifles have been extremely scarce, and Mr. Olson probably never had a good chance to examine a specimen and take it apart. I never thought I’d have a chance either, but suddenly their “extremely scarce” status was changed, via the military surplus arms market.

I first saw the 8mm Siamese rifles and actions advertised in the June 1, 1970, issue of “Shotgun News.” A member firm of the Inter-arms group once offered them as “M98 actions for rimmed cartridges,” and as “Sleek M98 actions designed exclusively for rimmed cartridges. Bolt face and magazine will accommodate such popular calibers as 45-70, 444 Marlin, 303 British and 7.62 Russian.” They were priced at \$20 each or, in lots of ten, at \$12 each.

Farther down in the ad complete rifles were described as “Cal. 8mmx52R M98 Thai rifles (Japanese manufacture) Model 45/46.” These rifles were priced at \$15 each in lots of ten. Selling the actions and rifles in lots of ten makes me believe they had a considerable number for sale and might result in the rifle and action becoming well known.

I ordered one action and the invoice listed it as “RT M-98 Mauser Action.” I have been informed by a reliable source that the marking RT on this action refers to Royal Thai. Thus, the action and the rifle are given several different designations, such as: 8mm Siamese Mauser (the one I use), M98 Thai (Thailand), and Model 45/46. The southeast

Asian country of Thailand was formerly known as Siam, hence the use of both names.

I have found but little history of the 8mm Siamese Mauser rifle, and not much of anything about the rifle itself.

Apparently most of these rifles were made in a Japanese arsenal—at least the actions, marked with three interlocking circles, are Japanese made. An item in the September 1955 issue of the *American Rifleman* mentions that some of these rifles were made in the Siamese government arsenal in Bangkok, Thailand, but I have no facts to prove this. Without much doubt, all of these actions and rifles that were for sale are of Japanese origin. I have no idea as to when or how many were made nor how long they were in service in Siam or Thailand, as the case may be. By the 1960s the Thai army was fairly well equipped with the most modern arms, with the 8mm Siamese Mauser rifles being sold as obsolete surplus arms sometime before the 1960s. The rifle is somewhat similar to the old German M98 Mauser. The stock has a semi-pistol grip and a finger-grooved forend that extends to within about 5” of the muzzle. It has a half-length wooden handguard held in front by the middle barrel band with the front sling swivel attached thereto. The rear sling swivel is screwed to the bottom center of the buttstock. The front and rear sights are typically M98 Mauser, with the graduation markings in unusual Siamese numerals. If the rifle is complete, its most identifiable feature would be the sliding breech cover which is not connected to the bolt and must be moved manually. Another distinctive feature is the Japanese Arisaka-type tangs to strengthen the grip area of the stock.

Action Markings

The 8mm Siamese action I have shows several distinct markings. The Siamese crest,

or coat of arms, is stamped on the top forward part of the receiver bridge. This crest is round and about 1/4” in diameter. A line of five Siamese numerals or letters is stamped on the receiver bridge below the crest, and another line stamped across the bridge. Although I have been unable to get these lines deciphered or translated, they probably refer to the date of manufacture and model designation. The Japanese arsenal proof mark, three interlocking circles, is stamped on the left receiver wall. Arabic numbers are stamped on various parts of the action, but those which are apparently the serial numbers are stamped on the flat bottom of the receiver ring and on the left side of the front tang of the trigger guard.

The Action

The 8mm Siamese is a copy of Paul Mauser’s M98 turnbolt action with certain modifications and additional features that make it one of the most distinctive and unusual forms of the basic M98. The modifications are essentially those needed to handle the 8x52R Siamese cartridge; the additions which are of Japanese influence include the detachable tangs and the sliding breech cover.

By carefully comparing the 8mm Siamese specifications with those of other M98 Mauser actions covered in this book, and by studying the photographs of this action and the others, it is easily seen that this is a peculiar variation of the Model 98 Mauser.

First, let’s see what this 8mm Siamese action has in common with the regular M98 military action made for the 8mm Mauser cartridge. The receiver is of the same general pattern and configuration, it is the large ring

(Above) The right side view of the Japanese-made 8mm Siamese Mauser action minus the tangs and sliding breech cover.



Siamese Mauser action open, tange in place and breech cover slid forward.

type and has the regular collar inside the ring, slotted only on the right for the extractor. It has the clip-charger guide slot in the bridge and the deep thumb cut in the left receiver wall. The receiver will accept a standard-length M98 bolt, though the receiver is only 8.50", or .250" shorter than the standard M98. The receiver is flat on the bottom and has the integral recoil lug like all other M98 actions.

Except for the bolt face and cartridge head recess, the bolt and firing mechanism are an exact copy of the M98 bolt. The straight bolt handle has a pear-shaped grasping ball. The bolt has dual-opposed forward locking lugs with the left (top) lug slotted for the ejector, a third rear safety lug, a guide rib, and twin gas-vent holes. The extractor is the same except that the hook is a bit narrower. The bolt sleeve, bolt sleeve lock, safety, firing pin, mainspring and firing pin head are enough like the standard M98 parts that they are almost, but not quite, interchangeable.

The bolt-stop and ejector are of the standard M98 pattern except that the ejector spring is riveted to the bolt-stop spring. The sear is also standard, but the trigger stem is cocked back a bit to bring the fingerpiece to a more rearward position.

In addition to these similarities, the Siamese action has the same functional features as the standard M98, including cock-on-opening, safety operation, extractor cumming, etc. Also, everything is disassembled and reassembled in the same way.

The differences between the two actions are:

1. The breech cover. The Siamese action is fitted with a very neat spring-steel breech cover which slides to the rear to expose the loading and ejection port, and forward to cover the

port. On each side of the receiver there is a narrow raised integral guide-rail over which the sides of the cover engage and slide. This is unlike the Japanese Arisaka receivers which are grooved for a sliding cover. On the right side of the Siamese Mauser breech cover there is riveted a hooked catch which engages notches in the side of the receiver ring and bridge to hold the cover either open or closed, and by which the cover can be slid back and forth. It is entirely independent of the bolt; it must be moved manually by grasping the hooked catch and pulling it outward. The cover can be removed by sliding it forward off of the receiver. The bolt can be operated and the rifle fired with the cover in any position, but it must be open to eject a fired case or to load the magazine.

2. Receiver shroud. The front end of the receiver has a shroud or collar extending about 1/8" forward as on the Polish Radom M98 Mauser. The purpose of this collar is to hold the rear of the handguard in place.

3. Barrel shank threads. The receiver is threaded to receive a barrel shank about .990" in diameter with 14 V threads per inch. The regular M98 actions have a pitch of twelve threads per inch and usually for a thread diameter of 1.10". The Siamese barrel is made with a shoulder large enough to abut and "set-up" against the front face of the receiver rather than having the breech face of the barrel butt against the inside receiver collar, as in the regular M98 action.

4. Left receiver wall. The 8mm Siamese receiver ring is slightly larger in diameter than the large ring M98 action, but unlike the latter, there is no "step" between the left side wall and the receiver ring. This means that the left receiver wall is much thicker in the Siamese receiver, and the reason that it is so

made is because of the breech cover guide rails. The average M98 Mauser left side wall is about .155" thick, while the Siamese Mauser is about .200" thick.

5. Bolt face. The recessed bolt head will accept a cartridge rim no larger than about .564". There are no lips extending forward on the left side of the rim recess as in the regular M98 Mauser action. The rim recess is cut away at the bottom to allow the cartridge rim to slip under the extractor hook on feeding a cartridge from the chamber, which prevents double loading.

6. Extractor hook. It is narrower than the extractor, being only about .300" wide.

7. Tangs. Separate upper and lower tang extensions on the 8mm Siamese action extend rearward about 3" and are inserted into the top and bottom of the grip of the stock. They are milled at the front end to fit closely against the rounded end of the integral receiver tang and trigger guard, and are held in place by the rear guard screw. The tangs, connected at the rear by a screw, are almost exactly the same as those used on the Type 38 Japanese Arisaka 6.5mm rifles and carbines. They are used to strengthen the grip area of the stock.

8. Magazine. The combined trigger guard/magazine is of one-piece milled steel construction like the regular M98 Mauser. The front and rear ends of the magazine box, however, are slanted forward at a sharp angle. This slanted magazine box permits easy loading of the larger rimmed 8mm Siamese cartridge, the slope preventing their rims from catching on each other. Each cartridge pushed into the magazine moves to the rear so that the next cartridge inserted over it will have its rim ahead of the cartridge rim below. To gain adequate magazine capacity, the rear of the magazine box



Bolt head of the Siamese action, showing: (A) twin gas-vent holes; (B) extractor; (C) right (bottom) locking lug; (D) undercut cartridge head recess; (E) ejector slot, and (F) slotted left (top) locking lug. The bolt also has the regular M98 Mauser short guide rib and the rear safety locking lug (not shown).

was made about $\frac{1}{4}$ " deeper than the regular M98 8mm Mauser. The floorplate of the Siamese action is not hinged, but is quickly detachable via a latch built into the forward part of the trigger guard bow. Due to the slanted magazine box, the trigger guard bow is positioned back farther than the regular M98 and for this reason the trigger shank is bent back as mentioned earlier.

Incidentally, the front and rear guard screws of the Siamese action have the same thread pitch as the regular M98 Mauser guard screws, but the Siamese screws are slightly larger in diameter. However, regular M98 Mauser guard screws can be used in the Siamese action, but not conversely.

The 8mm Siamese Cartridge

Generally referred to as the 8x52Rmm Siamese, this is a rimmed, bottlenecked cartridge normally loaded with a 181-grain pointed, jacketed bullet. Not much is known about it—when it was adopted or who developed it. It's probably merely a ballistically improved version of the older 8x50R Siamese Type 45 cartridge; a little longer case, a pointed bullet and more powder.

Fred A. Datig in his book *Cartridges For Collectors* designated this cartridge as the 8x52R Siamese Type 66—so does George C. Nonte in his book *Home Guide To Cartridge Conversions*. I don't know what the "Type 66" means. Regardless, if you have

the Siamese Mauser rifle and want to shoot it, there is very little chance that you will ever find any factory-loaded ammunition for it. If you are a handloader, Nonte suggests the following: make cases from new 45-70 brass, trim to 2.04" and turn the rim to .560" diameter. Full-length resize in a 33 WFC die, size down the neck and push the shoulder back in an 8mm die until the case will chamber, then fire-form. Use .323" bullets.

Comments

The 8mm Siamese Mauser action I received was in very good condition. Very well made and finished, it was as smooth in operation as any military M98 Mauser I've ever handled. I have no way of knowing the kind of steel used in making the receiver and bolt, nor do I know what heat treatment was given these parts. If I might guess, I'd say that if the arsenal in Japan that made the Siamese Mauser actions also made Arisaka actions, the same steel and heat treatment were used for both. I know that a file test for hardness is none too reliable, but it can be used to compare the hardness of such parts as rifle bolt heads. To do some comparing I took a file to the locking lugs of a couple of M98 German Mauser bolts, but could not get a good bite. This is normal, for most M98 bolts are very hard. Then I tried the file on the Siamese bolt and I could cut both locking lugs and the front edge of the bolt. Next, I got out two each of the Japanese Type 38 and 99 Arisaka bolts and, with the same filing effort, cut all four of them. Because the M98 Mauser bolt has smaller locking lugs than the Arisaka it is probably a good idea that they are made very hard. I don't think they have to be made as hard as they are for strength alone so I see no reason why the softer bolt in the Siamese action wouldn't be just as strong. However, to be on the safe side, the Siamese Mauser action should be limited to cartridges that do not develop much over 45,000 psi breech pressure.

The 8mm Siamese cartridge (8x52R) has a rim diameter of .561" and is about 2.925" overall. You'll recall that the ad I read called this action suitable for the 45-70, 444 Marlin, et al. I checked a number of cartridges in this action, and here's what I found.

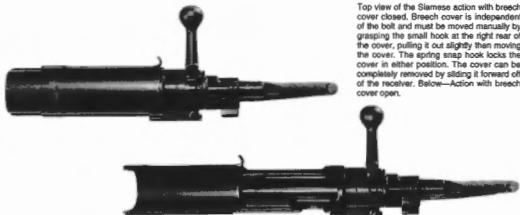
45-70. The 45-70 rim is .608" in diameter, too big for the .565" diameter recess in the bolt face. The front of the magazine well (cartridge guide lips) is also slightly too narrow to pass the 45-70 rim. The unaltered magazine will accept and hold 45-70 cartridges, but the bottom or last cartridge is not tipped high enough in front for it to feed correctly. To use 45-70 cartridges, the bolt face recess must be opened up to about .610" and the front of the magazine well widened—not difficult to do. The latter job will most likely end the feed problem of the last cartridge. With these modifications this is a good action for the 45-70 cartridge. Or do as the late George Nonte suggested; turn the rims down to .560 diameter.

444 Marlin I don't think the use of this action is going to be too successful with the 444 Marlin cartridge. The 444 rim diameter is only about .514", and the 8mm Siamese bolt face recess is too large for the too short extractor to hold this cartridge in place for proper ejection. Also, the magazine will not retain the first cartridge inserted into it; similarly, if the magazine is loaded with more than one cartridge, the last cartridge will pop out after the other cartridges have been fed. This last problem can be corrected by rebuilding the follower, but I know of no practicable way to reduce the bolt face recess. Therefore, if you want to use this action for the 444 Marlin I'd suggest you solve the bolt face recess and magazine problem before going to the trouble and expense of fitting a 444 barrel to the action.

303 British The 303 British cartridge is normally loaded to an overall length of 3.075" and it will just enter the 8mm Siamese magazine, with little length-room to spare. It has a rim diameter of .540", and it fits the bolt face recess OK, although for



Left side of the Siamese action with the breech cover, but minus the tangs.



Top view of the Siamese action with breech cover closed. Breech cover is independent of the bolt and must be moved manually by grasping the small hook at the right rear of the cover, pulling it out slightly then moving the cover. The spring snap hook locks the cover in either position. The cover can be completely removed by sliding it forward off the receiver. Below—Action with breech cover open.

better ejection of the fired cases the extractor hook should be a trifle longer. As with the 444 Marlin cartridge, the 303 British case rim is a bit too small for the rear width of the magazine well, and in order for the magazine to retain the first cartridge inserted into the magazine, or the last cartridge after the others have been fed, the right side of the follower ridge (left side of the follower) should be built up slightly. This can be done by sweating (soft soldering) a thin piece of sheet steel onto it. The 303 British cartridge does not fit this action perfectly, but it comes very close, and with the modifications to the extractor hook and follower, the Siamese Mauser action should prove to be ideal for this cartridge.

7.62mm Russian This is the old Russian military cartridge with rimmed case, and is not to be confused with the more modern 7.62x39mm Russian or the 7.62mm NATO cartridges. The 7.62mm Russian case has a rim of .564" and is loaded to an overall length of just over 3.00"—just short enough to fit in the magazine of the 8mm Siamese action. The several samples of this cartridge which I have in my collection fit perfectly. Norma has loaded this cartridge for several years and it is a good round for big game hunting. If you want to build a 30 caliber rifle on this action, then the 7.62mm Russian is a good cartridge to choose.

Other Cartridges

I found that the 30-40 Krag and the 348 Winchester cartridges are both quite suitable for the Siamese Mauser action. In fact, the 30-40 cartridge with a rim diameter of .545" fits this better than the 303 British. My opinion is that the 30-40 cartridge would be a much better choice than either the 303 British or 7.62mm Russian. Many wildcats have been developed on the 30-40 case—the 6mm Krag, 25 Krag, 35 Krag and the 30-40 Krag Improved. If not loaded to the extreme, any of them would be OK in this action.

The 348 Winchester is also well suited to this action. Its rim diameter of .610" requires the bolt face recess to be enlarged, but other than that, the 348 functions perfectly in this action. There are also some very fine wildcats based on this case—30/348 Improved, 35/348 Improved, 40/348 Improved, 44/348 and 450 Alaskan.

Gunsmithing

Because it is a basic M98 Mauser action, most gunsmithing work that has to be done,

or can be done, on a regular M98 for sporting rifle use can also be done on this oddball Siamese Mauser. For example, the bolt handle can be altered as usual by heating the shank and bending it down, or forging it in bolt handle bending blocks, or by cutting off the handle and welding it or a new bolt handle into the new position. Low scope safeties made for the M98 Mauser can also be fitted to this action. Several commercial M98 adjustable single stage trigger mechanisms will also fit, though on some it would be a good idea to heat and bend the finger-piece of the trigger back so it will position better in the trigger guard bow.

The breech cover can be removed and discarded, its guide rails ground off level with the receiver, and almost any top scope mounts made for the M98 Mauser can be fitted to the receiver. A receiver sight for the M98 Mauser will also fit this action. The breech cover can be retained and used with a receiver sight, but if this is done, the hook on the breech cover catch should be made longer. The breech cover cannot be used if top receiver scope mounts are used.

Stocking the 8mm Siamese action rifle is going to be the biggest problem for the amateur gunsmith, but if he can make a stock from a blank for any other centerfire carbolt rifle, he'll be able to manage this one. In stocking the rifle the separate tangs can be discarded.

This chapter may look a little bare; not having all of the usual detailed pictures, parts lists and other specifications. However, except for the hinged magazine floorplate and floorplate latch, the component parts of the 8mm Siamese Mauser are essentially the same as the M98 Mauser military action—covered elsewhere in this book.

General Specifications Japanese-made Siamese (Thailand) Mauser

Weight (complete with breech cover and tangs)	46 oz.
Total length (with tangs)	11.60"
Receiver length	8.50"
Receiver ring dia.	3.410"
Bolt body dia. . . . .	.700"
Bolt travel	4.425"
Striker travel . . . . .	.450"
Magazine opening (length)	3.00"
Receiver magazine-well width:	
Rear . . . . .	.645"
Front . . . . .	.560"
Bolt face recess	
Dia. . . . .	.565"
Depth . . . . .	.055"
Guard screw spacing	7.60"
Guard screw thread	1/4x22
Barrel shank and thread:	
Pitch (approx.)	14 V per inch
Length . . . . .	.515"
Dia. (approx.) . . . . .	.990"



Russian Mosin-Nagant Rifles

RUSSIA WAS NOT the first nation to adopt a smokeless-powder cartridge for military use, but they were ahead of the United States by one year; they adopted the 7.62mm Russian cartridge in 1891, while the U.S. adopted the 30 Gov't (30-40 Krag) cartridge in 1892. The cartridges were similar; both were based on a rimmed bottlenecked case, were of the same caliber (bullet diameter .308"), and loaded with round-nosed full metal-jacketed bullets. The 7.62mm Russian cartridge has a larger body diameter than the 30-40 Krag round, thus the Russian cartridge was the more powerful of the two. While the 30-40 cartridge was not much improved during the brief time the Krag-Jorgensen rifle was the official U.S. military shoulder arm, the 7.62mm Russian cartridge was improved from time to time and loaded with a great variety of bullets to adapt it to various military needs. Improvements began as early as 1908 when the Russians adopted the 150-grain spitzer bullet and loaded it to equal the ballistics and range of other military cartridges in use at that time.

As was the usual practice of most nations when major changes in a shoulder arm and cartridge were considered, the Russians, about 1883, appointed a committee to advertise for, study, test and make recommendations for the adoption of a new rifle and cartridge. After a few years of study two rifles remained under consideration. One was designed by a Belgian inventor and arms manufacturer named Emile Nagant, the other was designed by Sergey Ivanovitch Mosin, a Russian military man connected with the arsenal in Tula, Russia. After much study, experimentation and testing, the committee decided to use the Mosin bolt and receiver design and couple it with the Nagant-designed magazine. The final result was the Model 1891 Russian rifle, later to be known as the Model 91 Mosin-Nagant.

In 1891, and even later, Russia lacked adequate facilities to make the new rifle in sufficient quantities. As a result, the first M91 rifles were made at an arsenal in Châtellerault, France.

Russia eventually began producing the rifles, but they apparently could not make enough to meet their army needs, so large contracts were placed abroad. Shortly before 1917, two U.S. firms made around 1,500,000 of these rifles. Remington Arms Company, in Bridgeport, Conn., made over 750,000 and New England Westinghouse, in Springfield, Mass., made the rest. Remington and Winchester loaded many thousands of rounds of 7.62mm military ammunition for Russia during this same period. Smith's *The Book of Rifles* states that the SIG firm in Switzerland and the Steyr arms factory in Austria also made M91 rifles at one time. These figures, plus the far greater quantity that Russian arsenals made in the intervening years, indicate that many millions of Mosin-Nagant rifles were made.

The Model 91 and the later Mode 91/38 Russian rifle are quite plentiful, as they have been since the 1920s. Before Remington and Westinghouse had completed their contracts with Russia, and with many thousands of the new Russian rifles still in the U.S., the October revolution in Russia came and the contracts were canceled. This resulted in no small financial crisis for the firms making the rifles and ammunition. The U.S. government softened the blow by buying a great quantity of these rifles (one book says 600,000), many of which were later shipped to Russia. The U.S. was also short of rifles at our entry into WWI, and over 280,000 of these government-purchased Russian rifles were used for training U.S. troops during the first part of the war. Eventually, this last bunch of M91s were sold to NRA members through the Director of Civilian Marksmanship for less than \$3.50

each. Many of those made by Westinghouse were sold to private firms who resold them "as issued" or remodeled and converted to the 30-06 cartridge.

After WWII, surplus arms dealers found more Russian rifles abroad and apparently imported a great many into the U.S. They were regularly offered for sale all through the 1950s and 1960s. Probably few Russian rifles were taken home by American servicemen during WWII, but veterans of the Korean conflict considered them prizes.

The M91 Mosin-Nagant rifle was used by the Communist forces in Viet Nam. It seems that the preferred sniper rifle of the Viet Cong and North Viet Nam marksman was the M91 or M91/30 Sniper Rifle fitted with a short telescope sight.

Mosin-Nagant Rifles

There are several rifle variations based on the M91 M-N action. I will briefly describe the principal ones. First, of course, is the M91 rifle with a 30.5" barrel, weighing about 9.75 pounds. The first of these had sling swivels; later on swivels were omitted, and slots cut into the stock through which the sling could pass. Then there is the M91 Dragon rifle, its barrel 28.8" long and weighing about 8.75 pounds. The top of the receiver of M91 rifles is octagonal in shape and usually color case-hardened. Later models had a round receiver top, including the M91/30 standard rifle (28.7" barrel, and about 8.75 pounds) and the Sniper's rifle—about the same except fitted with a telescope sight. Several types of mounts and scopes were used on these sniper rifles. The scopes are the short and low-powered hunting type, attached with high-bracket

(Above) Russian Model 1891 Mosin-Nagant rifle, caliber 7.62mm Russian.



Russian Model 1891 Mosin-Nagant action; late version with the rounded receiver ring.

side mounts. The scopes usually had built-in windage and elevation adjustments, and usually with one or both of these adjustments also built into the mount. The mount base, attached to the side of the receiver, was designed to let the scope and mount bracket be easily detached. The sniper rifle had a long best-down bolt handle. Both M91/30s have a globe front sight.

There were also three M-N carbine models. The Model 1910 has a 20" barrel, weighs about 7.5 pounds, and has an unprotected blade front sight. The Model 1938 also has a 20" barrel, weighs about 7.6 pounds, and M1910 blade front sight. The Model 1944 has a 20.4" barrel, weighs about 8.9 pounds, and has a globe front sight. All M-N rifles and carbines have elevation-adjustable rear sights and are chambered for the 7.62mm Russian cartridge.

The Mosin-Nagant Action

An odd and unusual action, it has few features which can be said to have been copied from other actions. In fact, it has a number of features unique to it. In a way the action seems a fairly simple one, as indicated by its relatively few parts, but at the same time it has a complicated three-piece bolt assembly. Its design and manufacture is complicated because it has to accommodate a rimmed cartridge. Many small and minor parts are eliminated in its design; there are no separate safety or bolt-stop parts, and the number of trigger and bolt-stop parts is four. Even the novel magazine interrupter feature has only three parts, of which one is the ejector. Although the action is somewhat crude and is not easily operated, it is nonetheless quite reliable.

The Model 1891 actions with octagonal-topped receivers show much better workmanship throughout than do those with rounded receivers. This is especially true of the actions made by Remington and Westinghouse, doubtless because these plants were swarming with Russian inspectors (about 1500 of

them, according to one report) to see that every part was made just so. The actions made in Russia, especially during the war years, are rather poorly finished.

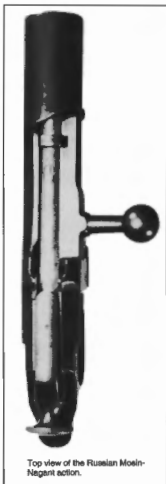
The receiver is a one-piece steel forging machined to final shape. The inside of the receiver ring is bored and threaded to receive the barrel shank. The breech end of the barrel is flat except for an extractor hook recess, taking up about one-third of its face. Most receivers have an inside collar, against which the barrel abuts; this ring is cut away on the right for about one-third of its circumference, to make room for the extractor. Very late wartime receivers don't have this inside collar. The rear of the receiver ring is milled out to receive the dual locking lugs on the bolt head.

The recoil shoulder under the receiver ring is quite heavy but narrow, affording only about a $1/2$ " x $1/4$ " bearing surface against the stock. However, a crossbolt is used in most of the stocks of these rifles to reinforce the wood in the recoil shoulder area.

A portion of the bottom of the receiver, from the recoil shoulder back, is milled flat. The magazine-well recess in the bottom of the receiver is milled out to approximate the shape of the rimmed 7.62mm Russian cartridge, with a sort of tunnel or chute milled out in the narrower front half of the well to allow passage of the cartridge head as the cartridge is pushed into the chamber.

The receiver bridge is slotted to allow the passage of the bolt handle and the bolt-handle base rib or guide. The forward end of this slot is widened out a bit and grooved to form a clip-charger guideway. A special charger clip, made of steel and holding five cartridges, is normally used to load the magazine, but it can be loaded with single cartridges pressed into the open action with the thumb.

The bolt of the Mosin-Nagant rifle is rather a complicated affair, difficult to describe. To begin with, the bolt body proper is made up of three separate parts: the bolt head, the con-



Top view of the Russian Mosin-Nagant action.

necting sleeve and the bolt body.

The bolt head, about 1.50" long, has two solid and opposed locking lugs on its forward end. The front edges of the lugs are rounded. When the bolt is in the locked position the lugs are horizontal, that is, to the left and right. This is the reverse of the Mauser locking lug system, where, when the bolt is locked, the lugs are vertical—one up and one down. Thus, when the M-N bolt is drawn back the upper (right) lug moves back through the slot in the receiver bridge, while the bottom (left) lug moves through the magazine well opening. On Mauser actions the left receiver wall is milled out for the left locking lug recessway, but on M-N the left receiver wall is solid. This gives very solid backing-up to the left lug, not



Model 1891 Russian action open.

unlike that afforded the bottom locking lug on the FN Mauser single shot benchrest action discussed in another chapter.

The face of the bolt is fully recessed for the cartridge rim except for the narrow extractor cut and ejector groove.

The extractor is a one-piece spring affair wedged in a slot and dovetailed in the bolt head because of the abutment of the dovetail, and it cannot move backward as long as the bolt is completely assembled. The inside collar in the receiver ring is cut away over the extractor, giving the latter room to move outward when the bolt is closed on a cartridge, which always moves into the chamber ahead of the extractor hook.

The main bolt body is nearly 4" long. Made integrally with it is a heavy guide rib, with the integral bolt handle positioned near the rear of this rib. This places the bolt handle well forward, or about midway in the action. The bolt handle has a round stem and a round grasping ball, and projects straight out to the right of the action. The Mosin-Nagant sniper rifle has a long-stemmed bent down bolt handle. The heavy guide rib, extending almost from the receiver bridge to the receiver ring, has several functions. It guides and prevents the bolt from binding as it moves through the slot in the receiver bridge when the bolt is opened and closed. It also acts as a third safety lug when the bolt is closed by engaging forward of the receiver bridge, and this same bolt closing cams the bolt fully forward as the handle is turned down. On opening the bolt, initial camming power is provided by the forward end of the guide rib moving across a sloped surface on the receiver ring. The guide rib also links up with the bolt head and bolt connection sleeve, as will be pointed out later on.

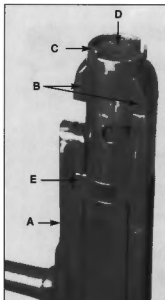
The bolt body and the bolt head are aligned and connected by the bolt connecting sleeve. Each end of this sleeve is turned down to fit inside the bolt body and bolt head, leaving a ring about $\frac{1}{32}$ " thick separating body and head. A 6.5" long guide bar is an integral part of the bolt-connecting sleeve, and with the assembled bolt in the action, it lies in the bottom locking lug raceway. The bolt body, connecting sleeve and bolt head are held together as a unit, when the bolt is assembled in the action, by a lug on the connecting-sleeve collar engaging in a groove in the bolt-guide rib, and by a stud on the connecting-sleeve guide bar engaging in a groove in the bolt head. A stud on the bolt head engaging in a groove in the bolt-guide rib causes the bolt head to rotate with the bolt body. In raising and lowering the bolt handle the connecting sleeve does not rotate.

The bolt body is drilled and bored out from the front, leaving a step-down in the rear end. The coil mainspring is compressed against this step-down and against the collar on the one-piece firing pin. The rear end of the firing pin threads into the heavy one-piece cocking piece. The firing pin is prevented from turning in the assembled bolt by the bolt connector sleeve, through which the flattened end of the firing pin passes. The cocking piece, although only of one-piece construction, is a product of many machining operations. It has a heavy guide rib which extends into the receiver bridge slot. A projecting cam on the cocking piece falls within a matching cam notch in the rear of the bolt body and, on raising the bolt handle, the cocking piece and firing pin are moved back to cock the action. The rectangular sear lug on the bottom of the cocking piece is loosely mortised in a notch in the rear end of the connecting-sleeve guide bar.

No provision is made to allow powder gases to escape harmlessly out of the bolt or action in the event of a pierced primer or ruptured case head. Gases escaping into the firing pin hole from a pierced primer would not likely get to the shooter's face but would probably dissipate through the joint of the bolt head and bolt connecting sleeve. In the case of a ruptured case head, especially if the break were in the upper half of the head, the gases would escape through the ejector groove and through the upper locking lug raceway, which would aim the gases directly toward the shooter's forehead. Late models, without the inside receiver collar to partly surround and enclose the bolt head, would afford even less protection. However, the occurrence of case head rupturing is extremely rare, and there is little chance of it happening with new ammunition.

The trigger is held to the receiver by a heavy pin running through integral lugs on the receiver. The sear, a one-piece flat spring affair, is attached to the receiver by a heavy screw. The rear part of this spring sear extends through a hollow in the trigger, with a projection which extends through a hole in the receiver into the locking lug raceway. The trigger has a single-stage pull, but when the action is cocked there is considerable slack in the trigger. Because the sear itself is a spring, and that quite heavy and short, the trigger pull is "spongy," that is, the weight of pull seems to increase as one pulls the trigger through.

A groove milled lengthwise in the bottom of the connecting-sleeve guide bar (ending about 1" from the front end of the bar) is the raceway for both the sear and the stud on top of the trigger. The bolt is stopped by this stud contacting the end of the groove in the guide bar.



Underside view of the front end of the Russian Model 91 bolt showing: (A) bolt guide lug, (B) lock lugs, (C) extractor, (D) cartridge head recess and (E) bolt connecting sleeve.

There is no separate safety mechanism on the Mosin-Nagant action, but there is a safety. The rear of the cocking piece ends in a good-sized knurled knob, and the cocked action can be made "safe" by grasping the cocking piece firmly, pulling it back slightly and rotating it counterclockwise as far as it will go. This will hold the cocking piece and firing pin back, while locking the bolt at the same time. The safety is disengaged by reversing these movements. Considerable effort and a good grip is required to place the rifle in the "On" and "Off" safe positions.

The combination magazine/trigger guard is of one-piece steel construction. The vertical opening through the magazine is just wide and long enough for the 7.62mm Russian cartridge. The sides of the magazine have two step-downs; one near the back to match the cartridge rim, and one at about the shoulder of the cartridge, so that the opening is narrower in front to match similar step-downs milled in the receiver-well opening. A hinged cover closes the bottom of the magazine. It is hinged on a heavy rivet through the front of the magazine and closed by a spring catch screwed to the rear of the magazine.

The magazine follower assembly, hinged to the magazine cover (floorplate), is composed of the follower arm, follower plate

hinged to the arm, a spring for each and a screw to attach the follower-arm spring to the cover. Pulling back on the end of the latch, which projects from a hole in the rear of the magazine cover, opens the cover to unload the magazine. Depressing the follower plate against the cover permits the entire follower assembly to be detached.

The action is held in the stock by two guard screws clamping the receiver to the magazine/trigger guard. The rear guard screw extends through the receiver tang and threads into the trigger guard bow; the front guard screw goes through the front of the magazine and threads into the recoil shoulder.

A novel feature of this action is the cartridge feed-interrupter and ejector system. The ejector, a flat piece of steel, fits into a narrow slot cut into the left of the receiver, projecting inward. It then moves into a groove in the bolt head to hit the cartridge rim as the bolt is opened. The ejector is held in place and tensioned by the cartridge feed-interrupter, a bent piece of spring steel attached to the receiver by a screw. The front end of the interrupter projects into the top left of the rear part of the magazine, where it engages the second cartridge from the top in the magazine. Its main function is to prevent double loading. It does this by holding the second cartridge down, freeing the top cartridge from any tension of the follower, so it can be fed easily into the chamber; it frees the next cartridge only when the bolt is fully closed on the cartridge in the chamber, in which case the extractor hook has positively engaged the cartridge rim so it will be extracted when the bolt is opened again. When the bolt is closed and the handle turned down, the interrupter is pushed to the left, by a cut in the bolt body, to allow the top cartridge to rise. When the bolt handle is raised the interrupter again holds the second cartridge from the top down to repeat the cycle. The employment of the interrupter does much to eliminate feeding problems with rimmed cartridges.

Takedown and Assembly

Make sure magazine and chamber are unloaded. Remove bolt by raising bolt handle, then pull it back while pulling the trigger back as far as it will go; the bolt can now be pulled free. The bolt can be put back into the receiver without pulling the trigger back.

Disassemble the bolt as follows: grasp bolt handle and, with the other hand, grasp the cocking piece; pull cocking piece back slightly, rotate it counterclockwise slightly and allow it to move forward; bolt head and bolt connecting sleeve can now be pulled forward off the bolt; rotate bolt head on bolt connecting sleeve until the two can be separated. Do not remove extractor unless necessary; to do this insert blade of a small screwdriver under

extractor hook to raise it above the edge of the bolt head, then drive extractor to the rear. Replace extractor by merely slipping it in place, then drive it forward until its rear end is flush with the bolt head.

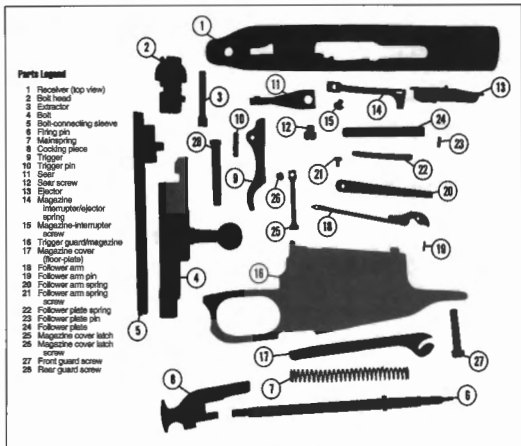
Disassemble the firing mechanism by unscrewing firing pin from cocking piece—about fifteen complete turns are required. The firing pin and mainspring can then be withdrawn from the bolt. Reassemble in reverse order, starting with cocking piece in the down or fired position. Turn the firing pin in until its end is flush with the cocking piece knob and index marks line up. Reassemble bolt head and connecting sleeve together, so the guide bar stud is engaged in the bolt head groove, then place these parts over the firing pin. Line up guide bar so it will slip over the rear on the cocking piece, and the stud on the bolt head so it will slip into the groove in the bolt guide rib until the three parts are against each other. Now grasp the bolt handle and cocking piece and, while pulling back on the cocking piece, rotate it clockwise until the end of the cocking can fall into the shallow notch in the rear of the bolt.

As noted earlier, release the magazine cover by pulling back latch, swing cover down and press against follower. This releases the entire assembly from its hinge rivet. Remove follower-arm spring by turning out its screw. Remove follower-plate spring by pressing its end down, then swing it aside. Pushing out the two follower and follower-plate pins separates these parts. Reassemble in reverse order.

Turning out the two guard screws allows magazine/trigger guard to be pulled from the bottom of the stock; the barrel and action may be lifted from the top of the stock after removing the barrel bands. Remove magazine-cover latch by turning out its screw; turn out magazine-interrupter screw, remove interrupter and lift out ejector. Turn out the rear screw, then push out trigger pin and trigger. The rear can now be removed. Reassemble in reverse order.

Comments

The various models of the Russian Mosin-Nagant rifle have proved very reliable military weapons—just consider the fact that they have been in use continuously since 1891, longer than almost any other military bolt action rifle. The M-N rifle may seem crude to most persons familiar with the various military bolt action rifles, and in my opinion the M-N action is a crude affair compared to the 98 Mauser action or to our own 1903 Springfield action. Nevertheless, the M-N action is still a good one, and the U.S.-made Russian rifles could hardly have been made any better. Remington probably never made other rifles before or since under so much supervision and such rigid inspections as they did these



Russian Mosin-Nagant

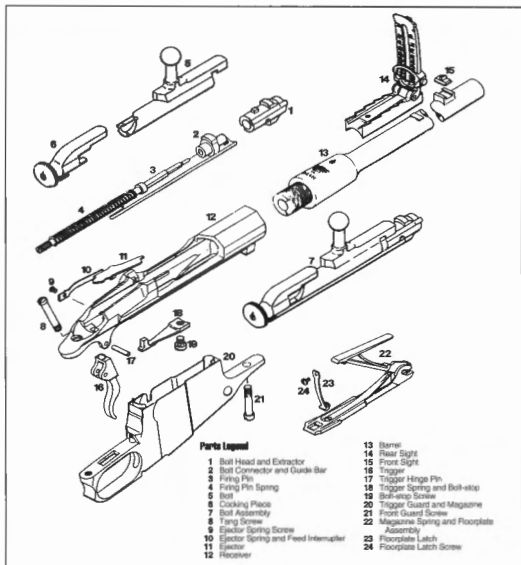
Dimensional Action Specifications

Weight	.....45 oz.
Overall length	.....8.87"
Receiver ring dia.	.....1.225"
Bolt body dia.	......850"
Bolt travel	.....4.470"
Striker travel	......485"
Magazine opening: Length	.....3.140"
Bolt face recess:	
Depth	......060"
Dia.	......575"

*Approximate dimension for round receivers. Early receivers with octagonal top are about 1.230" wide across the flats.

General Specifications

Type	.....Turnbolt repeater.
Receiver	.....One-piece machined steel forging with slotted bridge. Stripper-clip charger guides milled in the bridge.
Bolt	.....Three-piece, with dual-opposed locking lugs on forward part of the bolt head. Guide rib on bolt body acts as safety lug.
Ignition	.....Composed of one-piece firing pin, coil mainspring and cocking piece. Action cocks on opening.
Magazine	.....Single column, non-detachable box magazine of 5-shot capacity. Hinged and detachable magazine cover (floorplate). Magazine has cartridge-feed interrupter—see text.
Trigger	.....Non-adjustable single-stage pull.
Safety	.....No separate safety, but cocked action can be placed in "safe" position by rotating cocking piece.
Extractor	.....One-piece rotating spring type dovetailed into bolt head.
Magazine cut-off	.....None.
Bolt-stop	.....A stud on the trigger engaging in a groove in the bolt connecting sleeve.
Ejector	.....One-piece, recessed in the left receiver wall.



rifles. The M-N rifles made in Russia, especially those made during WWII, were not nearly so well made and finished, yet they were reliable military rifles. All were more than amply strong for the 7.62mm Russian cartridge.

For use on a sporting rifle the M-N action has a number of faults, yet many M91 rifles have been sporterized. Among the action's

drawbacks and poor features, for use on a hunting rifle, are: the bolt handle is too far forward for easy and rapid manipulation. Putting the safety on and off is too hard; the projecting magazine often interferes with carrying the rifle; the trigger pull is poor, and the action is not well suited for a receiver sight or scope.

Little, if anything, can be done to remedy

or correct these drawbacks. The bolt handle can be bent down or a new bolt handle made and attached to place the grasping ball lower and further back. Nothing can be done to improve the safety, although it is possible to make and install a different type of safety, such as a cross-bolt type behind the trigger, through the stock or trigger guard. There is no practical way to change or eliminate the pro-



Close-up of Russian Model 1891 Mosin-Nagant action; early type with octagonal receiver.

jecting magazine. Not much can be done to change or improve the trigger, except perhaps making the pull a bit lighter and smoother by honing the trigger and sear contacting surfaces. No commercial trigger or safety mechanism has ever been made for the Russian rifle.

Although there is not a single outstanding feature about the Model 91 Russian rifle or on its action which would recommend it for remodeling into a sporter, amateur gunsmiths often overlooked this, or point out that the "challenge" this rifle presents makes them want to tackle it. When these rifles were cheap and plentiful in the 1920s and 30s many were remodeled and used for deer hunting and the like. This work ranged from merely shortening the forend and barrel, and perhaps fitting a new set of hunting sights on the barrel, to super deluxe jobs, such as one that the famous stockmaker, the late Alvin Lindén, once did.*

Because of the faults already mentioned, I hardly think it advisable to do any extensive remodeling of this rifle. About the only job I'd recommend would be to shorten the barrel to about 22", remove the original rear sight, install a Williams Guide rear sight and front sight on a ramp, and remodel the original military stock.

I certainly advise against rebarreling this action, whether to its original caliber or to any other caliber, since the action is neither worth it nor is there any other cartridge the action will handle better than the 7.62mm Russian. I am also against rechambering or reboring the barrel for another cartridge or caliber.

I have never heard of or read about a Mosin-Nagant rifle blowing up when used with military or commercial 7.62mm Russian ammunition. Years ago, however, when these

rifles were a drug on the market, some shops converted them to 30-06 caliber to make them more marketable and some of these rifles actually did blow up. In one case the shooter was reported killed. I do not know how the conversion from the 7.62mm Russian cartridge to the 30-06 cartridge was made, but they were booby traps and definitely very dangerous to fire. The chances are that the barrel was merely rechambered without setting it back, and the blow-ups were the result of case failure in the oversize chamber. Firing a 308 cartridge in the M91 rifle could be as disastrous as the M91 30-06 booby traps. Therefore, if you want an M91 Mosin-Nagant rifle to shoot or remodel, just make sure it has a good bore, that it has not been previously rechambered, and preferably made by Remington or Westinghouse, or made before 1940.

Much information about gunsmithing and remodeling the M91 Russian rifles can be found in *The Modern Gunsmith* by Howe, and *Modern Gunsmithing* by Baker.

Markings

On most Mosin-Nagant rifles the serial number is usually stamped only on the top of the bolt-guide rib. On most rifles made in Russia the date (year) of manufacture is usually stamped on top of the breech end of the barrel. Sometimes the words **MADE IN U.S.S.R.** are also stamped on the receiver ring.

Model 91s made by Remington have the words **REMINGTON ARMORY**, date (year) and serial number stamped on the top of the breech end of the barrel.

The 7.62 Russian Cartridge

The 7.62mm Russian cartridge has a rim-

med and bottlenecked case of fairly large capacity. Powerful and accurate, it is a proven military cartridge. The normal bullet load used by the Russians and other countries (Model 1908 Ball) has a 150-grain pointed bullet, driven at about 2850 fps muzzle velocity.

Because so many M-N 1891 rifles remained in the U.S. after WWI, and because many of them were sold to shooters, Remington began to load a sporting cartridge for it in the 1920s. This carried a 150-grain Bronze Point expanding bullet at a velocity of about 2700 fps. Remington discontinued this cartridge about 1950. Since that time, however, a great many more Russian rifles were sold on the surplus arms market, and shooters began calling for this cartridge again. In response, Norma-Precision reintroduced the 7.62mm Russian cartridge in the mid-1960s. The Norma load has a 180-grain semi-pointed, softpoint boattail bullet, advertised muzzle velocity 2624 fps—against 2610 fps at the muzzle for Norma's 308 cartridge loaded with the same bullet. Of course, the Norma cases are reloadable. The obsolete Remington 7.62mm Russian load accounted for many head of big game on this continent in past years, and the Norma load should prove even more effective with its heavier .308" diameter bullet. The maximum established working pressure of this 7.62mm cartridge is about 45,000 psi. The Norma load is listed as producing about 42,000 psi against 49,000 psi given for the Norma 308 load mentioned above.

The 308 cartridge is interchangeable with the 7.62mm NATO cartridge, but these cartridges are not interchangeable with the 7.62mm Russian cartridge.

**The American Rifleman*, Dec., 1927, and Jan., 1928.
 *The 7.62mm Russian Rifle." by Alvin Lindén.



Springfield Models 1903, 1903A3 & 1903A4

AS IN THE other chapters in this book, my primary intention here is to thoroughly discuss Springfield actions only, i.e., how the actions are made, describing them, listing their strong and weak points, how to remodel them, etc. You may not find here everything you want to know about the history and development of the 1903 Springfield rifle, or learn about the many variations produced. For this information I suggest you obtain one or all of the following books: *The '03 Springfield* by Campbell, *Hatcher's Notebook* by Hatcher, *The Book of the Springfield* by Crossman and, the best book of all, *The Springfield 1903 Rifles* by Col. W. S. Brophy.

The Spanish-American war of 1898 proved that the 93 Mauser rifle and its 7mm Mauser cartridge were superior to our best service rifle and cartridge then in use, namely the caliber 30-40 Krag-Jorgensen. Immediately after the war the United States began development of a new cartridge and rifle. The planning was largely done by boards set up for this purpose, and the work done mostly at the U.S. Springfield Armory, Springfield, Mass., hence the popular name, "Springfield."

Several experimental rifles were tested from 1900 to 1903 before the final version was adopted in 1903, thus the designation of Model 1903 Springfield. Adopted at the same time was a rimless bottlenecked case with the designation of "Caliber 30, Model of 1903," or 30-03 for short. This cartridge was still not the ballistic equal of the 7.9 (8x57mm) Mauser cartridge, with its spitzer bullet, but in 1906 the United States adopted a new and lighter bullet of spitzer or pointed form and the new cartridge was designated the "Caliber 30, Model of 1906," or 30-06 for short. Those Springfield rifles made up to that time were recalled and modified for the new round by refitting the barrel.

The M1903 Action

The Springfield action which emerged in 1903 was sound and compact, a well-designed and well-built turnbolt action having several features copied from the 93 and 98 Mauser actions. The truth is that the United States had to pay Mauser a royalty on each rifle made which resulted in their receiving \$200,000 for infringements on the action and stripper clip patents. The 03 Springfield had such Mauser features as the dual-opposed forward locking lugs; non-rotating extractor fastened to the bolt with a collar; staggered-column, non-detachable flush magazine box combined with the trigger guard, and a bolt sleeve which threaded into the rear of the bolt.

The receiver is a one-piece machined steel forging. The front end of the receiver is threaded to accept the barrel shank, which is .734" long, with a body diameter of .990", a thread diameter of 1.040". The threads are square with a pitch of ten threads per inch. The breech end of the barrel is funneled as a possible aid to guide cartridges into the chamber when fed from the magazine. The rear inside of the receiver ring is machined to form shoulders against which the locking lugs on the bolt can engage to hold the bolt against the barrel during the thrust of firing.

The bottom of the receiver from the front of the seat to the recoil shoulder is flat. The recoil shoulder is of ample size (about 1.050" wide and .360" deep) to prevent rearward movement of the action and barrel in the stock due to recoil. The major part of this flat surface is milled out for the magazine opening. The milling is done so as to leave integral cartridge guide lips in the receiver.

The left receiver wall is smooth with the receiver ring, and is nearly as high as the top of the bolt. The right wall (or rail) is only as

high as the bottom of the extractor, which leaves a more than ample receiver opening for loading the magazine.

The receiver bridge is, technically, unslotted since it has a thin raised top to cover or contain the mill-cut groove that allows passage of the safety lug on the bolt. This makes the top of the bridge higher than the receiver ring. Clip-charger grooves in the front of the bridge provide a means of loading the magazine with cartridges held in a stripper clip.

The bolt with its integral handle is also a one-piece machined steel forging. The right (or lower) locking lug is solid, while the left (or top) locking lug is slotted for the passage of the ejector. The bolt face is partly recessed for the cartridge head. The recess is undercut to allow cartridges to slip under the extractor hook as they feed up out of the magazine. This prevents double loading because the cartridge being fed into the chamber from the magazine will be extracted and ejected on opening the bolt, even if the bolt is not fully closed on chambering the cartridge.

The bolt handle has a round tapered shank bent down to about a 45 degree angle and

(Above) The Model 1903 U.S. Springfield rifle, caliber 30-06. This rifle weighs about 8.7 pounds, has a 24" barrel and is 43.2" overall. The full-length one-piece stock has a straight grip with finger grooves in the forend. Its steel buttplate contains a hinged padlock that gives access to the hole within that holds cleaning accessories. The rear sight, adjustable for windage and elevation, is attached to the breech end of the barrel. The one-piece wooden handguard extends forward to the end of the forend. The barrel has a groove diameter of .308", with the four-groove rifling having a pitch of one turn in ten inches (right-hand twist).



Model 1903 Springfield action.

ends in a round grasping ball. The square base of the bolt handle extends upward, partly over the rear end of the bolt. The front of this raised portion is inclined and imparts the initial camming power to the extractor when the bolt is opened, by contacting and moving against a matching surface milled in the receiver bridge.

The large safety lug is located about 1.25" ahead of the bolt handle base; when the bolt is closed and locked it is positioned forward of the bridge. This lug is not supposed to contact the bridge; its only function is to hold the bolt in the receiver in the event the receiver ring or the two forward locking lugs should fail. The gap between the safety lug and the receiver should be not less than .004", although it can be much more than this and not impair the function of the lug.

The long Mauser-type spring extractor, which does not rotate with the bolt, is fastened to the bolt by a hooked collar around the bolt engaging a mortise inside the extractor. A lug inside the front end of the extractor rides in a groove cut into the bolt head, which prevents longitudinal movement of the extractor on the bolt. The extractor is made to slip easily over the rim of a cartridge placed in the chamber ahead of the bolt.

The bolt is drilled from the rear to accept the firing mechanism, which consists of the firing pin, striker, mainspring, striker sleeve and bolt sleeve assembly. The bolt sleeve has square threads that turn into the bolt. The round striker rod extends through the bolt sleeve, and the coil mainspring is compressed over it by the striker sleeve, which is in turn held back by the separate firing pin mortised over the front end of the striker rod.

The cocking piece, with its integral cam, is threaded and peened on the end of the striker rod so it cannot loosen or turn, and is flared and knurled so the striker can be manually cocked or uncocked. This feature is of small value except when one might want to re-cock the bolt after a misfire or hangfire. The extra metal adds weight to the striker, however, and this can be helpful to ignition. The cocking piece, striker rod and separate firing pin of the Springfield action are more or less a hold-over from the U.S. Krag-Jorgensen rifle.

The cocking cam part of the cocking piece extends through a slot in the bolt sleeve and into a raceway in the receiver tang, and then forward into a deep cam notch cut in the rear of the bolt. The striker is cocked on the uplift of the bolt handle.

A small spring and plunger bolt lock fitted into the left side of the bolt sleeve, and engaging in a shallow notch in the bolt when it is open, locks and prevents the bolt sleeve and firing mechanism parts from turning when the bolt is drawn back.

The round stem of the wing safety (another Krag-Jorgensen hold-over) is fitted in a hole lengthwise in the top of the bolt sleeve. The wing, which contains a small spring-loaded plunger, and the stem of the safety are peened together. The plunger rides in a shallow groove cut into the bolt sleeve, providing tension to the safety to keep it in place, and in the On or Off positions. The safety is in the Off or Fire position when it is to the left. The safety can only be swung over when the action is cocked and bolt closed; the grooves in the safety then line up with matching notches in the top of the cock-

ing piece. When the safety is swung upright or to the intermediate position, only the striker is locked back and the bolt can be opened and closed. When the safety is swung to the far right or Safe position, both the striker and bolt are locked.

The magazine cutoff is positioned in a recess in the left side of the receiver bridge and is held in place by, and pivots on, a pin lengthwise in the receiver. The cutoff serves a dual purpose; to allow the rifle to be used and loaded as a single shot with a fully loaded magazine, and as a bolt-stop to halt the rearward travel of the bolt. The cutoff contains a small spring-loaded plunger which rides in a shallow groove on the receiver. The groove has three depressions for the three positions to which the cutoff can be pivoted. When the cutoff is up with the word "On" showing, it is in the normal position to halt the bolt travel and allow the bolt to pick up cartridges from the magazine when it is closed. Swung to the lowest position so that the word "Off" shows, the rearward travel of the bolt is halted about .375" short of its normal length of travel, so that the head of the top cartridge in the magazine remains under the bolt head, and cannot be picked up by the bolt when it is closed. When the cutoff is placed in its intermediate position (swung outward), the bolt can be removed from the receiver.

The small ejector is fitted inside the receiver bridge just ahead of the cutoff. It pivots on, and is held in place by a pin through its underside. It does not have a separate spring, but is pivoted so its end is tipped into the ejector slot on the left locking lug by the action of the locking lug against the base of the ejector.



Left side of the Model 1903 Springfield action.

The trigger mechanism is composed of the trigger, sear, sear spring, and trigger and sear pins. The trigger is a standard military double-pull type. The front face of the trigger is curved and grooved.

The trigger guard and the magazine box are milled from a one-piece steel forging. The barrel and action assembly is securely held in the stock by two guard screws through holes (in each end of the trigger guard) which thread into the recoil lug and tang of the receiver. The guard screws have a $\frac{1}{4} \times 25$ thread. The magazine floorplate has lips on each end which engage in matching recesses cut into the guard, and is retained in position by a small spring-actuated catch positioned just behind the magazine box. The floorplate can be quickly detached by depressing the latch with a pointed tool or bullet through a hole in the rear of the plate and sliding it back.

The steel magazine follower is tensioned by a W-shaped flat spring whose ends go into mortises in the floorplate and follower. The ridge on the top left of the follower causes the cartridges to be staggered in the magazine box when it is loaded. The rear end of the follower is squared and prevents blind loading when the magazine is empty by halting the forward travel of the bolt, a sign to the shooter that the magazine is empty.

The O3 actions were made with a small spring and plunger which was called the bolt-stop. It was a flat spring with a small round-tipped plunger attached to one end. It was positioned under the receiver, in a groove in the rear of the magazine well, with the plunger projecting through a hole into the bottom of the left locking lug raceway.

There it contacts, and is depressed by the locking lug, which has two small indentations in its lower surface. With the magazine cutoff in the On position, and the bolt opened and drawn back, the bolt-stop plunger falls into the foremost indentation. With the cutoff in the Off position the plunger is aligned with the rearmost indentation when the bolt is open. In either case, the intended purpose of the bolt-stop was to provide some friction to the bolt when it was drawn back, so that it would not fall forward of its own weight if the muzzle of the rifle was lowered. It was thought that this would be helpful in single-loading the rifle when the cutoff is in use, since it was likely the muzzle would be lowered so the cartridge could be dropped into the chamber. The bolt-stop, however, seemed to interfere with the rapid operation of the bolt, and many owners removed it, as did ordnance repairmen in later years when these rifles were serviced.

Provisions were made in the O3 action to allow powder gases to escape in the event of a pierced or ruptured primer or split case head. A vent hole was provided in the head of the bolt to allow gas to escape into the left locking lug raceway if it entered through the firing pin hole. The size of this hole varied, nor was there generally a hole provided in the receiver ring opposite the hole in the bolt, except in actions made after the mid-1930s. The gases entering the raceway would be directed to the rear and could get into the shooter's face. A gas escape hole was provided, however, through the right side of the receiver ring in line with the extractor slot in the barrel. Generally, a small hole was drilled in the front of the



Top view of the Model 1903 Springfield action.

U.S. Model 1903A3 Springfield rifle, caliber 30-06. A World War II modification of the M1903 Springfield, it differs from the 03 mainly in that the rear sight is mounted on the receiver bridge and the trigger guard/magazine is a sheet-metal stamping. The compact 1903A3 aperture rear sight is adjustable for elevation and windage. The barrel has the same bore specifications as the 03 except that most of them are made with only two grooves; however, some were made with four or six grooves. 1903A3 rifles were made by Remington Arms Co., Ilion, N.Y. and by Smith-Corona Typewriters, Inc.



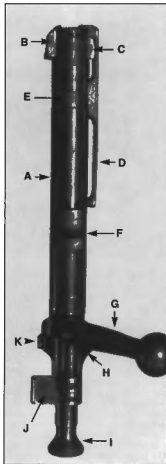
extractor in line with the hole in the receiver. In the event that a cartridge head should split facing the extractor slot, these holes would probably allow enough gases to escape to avoid damaging the extractor or injuring the shooter.

The Mark I M1903 Action

In 1917 Mr. J. D. Pedersen, an arms inventor employed by Remington, developed and patented a small automatic firing device (later known as the Pedersen Device) which replaced the bolt in the 03 Springfield. It fired a special 30-cal. pistol-sized cartridge from a forty-shot magazine. The 03 action had to be slightly modified to use this device. The device was adopted in 1917 and, although many more were ordered, the Remington factory finished only about 65,000 of them before the war ended and the contract was canceled. They were not used and practically all of them were destroyed, along with the 65 million rounds of ammunition made for them. However, as the Pedersen Devices were being made, the Springfield Armory had the job of furnishing 03 rifles to handle them. Apparently, the rifles were not conversions of already manufactured regular 03s. Instead of making the regular rifle, they made the Mark I, since the MARK I stamp is included with the regular marking and not added to previously marked receivers. No special serial numbers were assigned to these rifles; they were serial numbered in sequence with the regular 03 Springfields. The modifications to the Mark I action consisted of milling an oblong hole in the left receiver wall to provide a cartridge-case ejection port, installing a slightly different magazine cutoff having a round groove to hold the device in the receiver, and a special sear with an extra lever to function as the disconnector for the automatic firing device. With these modifications the rifle could still be used with its original bolt to fire the 30-06 cartridge. Springfield Armory made approximately 101,775 of the Mark I 03 rifles, all of which, reportedly, were later released when the Pedersen Devices were destroyed in the early 1930s.

Mark I actions, all made after the change to the double heat treatment, are as strong and serviceable as the regular Model 03 double heat treatment actions.

When the Mark I rifles were released for use again as regular rifles, the special cutoff was replaced with a standard one. However, the special sear with the disconnector lever was not always replaced. This sear is as functional as the regular sear. Most of the Mark I rifles were released through the DCM and sold as regular rifles. Except for the oblong hole in the receiver wall, which may be unsightly to some shooters, these actions and



Model 1903 Springfield bolt. (A) bolt body, (B) left (upper) locking lug, (C) right (lower) locking lug, (D) extractor, (E) extractor collar, (F) auxiliary safety lug, (G) bolt handle, (H) bolt sleeve, (I) cocking piece, (J) safety, (K) bolt sleeve lock.

rifles are as serviceable as the regular actions and rifles without the hole.

National Match Sporter and Target Actions

Each year, from 1920 to about 1940, Springfield Armory made up a quantity of specially selected 03 rifles to be used in the National Matches. These were called National Match Springfields, but they were not marked as such. Their serial numbers were in sequence with regular 03 rifles. There were various models of these target rifles made, including some with heavy barrels, but it is



Model 1903A3 Springfield action.

not our purpose to describe those special barrels here since it is the actions in which we are interested. However, all of these match rifles were fitted with "star-gauged" barrels, which means that the barrels were selected by means of a gauge which determined bore and groove diameter to insure uniformity. The barrels selected were then marked with a star-like stamp on the muzzle. However, it must be noted that not all of the Model 03 rifles fitted with star-gauged barrels are National Match rifles. These barrels were available separately to anyone who wanted one installed on a Springfield rifle. Also, some National Match Springfield rifles were assembled on receivers made by the Rock Island Arsenal and they are so marked.

Briefly, the actions used in making up these match rifles were regular 03 actions, selected for close tolerances between bolt and receiver and for uniform quality. The National Match receivers were Parkerized, the Target and Sporter actions were generally "browned." The locking lug and cocking cam raceways were honed smooth. The

bolt and the extractor were polished bright and, in most cases, the serial number stamped on the receiver was etched on the bolt body. The primary extractor cam surfaces, cocking cam surfaces, and locking lug cam surfaces were also honed or burnished very smooth. The contacting sear surfaces and trigger-to-receiver surfaces were also honed to provide a very smooth and uniform trigger pull. The nose of the sear was shortened to reduce the final stage of the trigger let-off. The feed ramp was also polished smooth. Everything was done to make the action as smooth and as easy to operate as possible.

Some of the match actions were fitted with a reverse safety. Others were made with a stiffer mainspring to achieve a faster lock time. Most of the receivers were also drilled and tapped to accept the Lyman No. 48 receiver target sight. In short, these actions were superb. Depending upon when they were made, the receiver and bolts of these National Match actions were made of either

the double heat treated carbon steel or nickel steel. All these actions are in the "high aerial number" range.

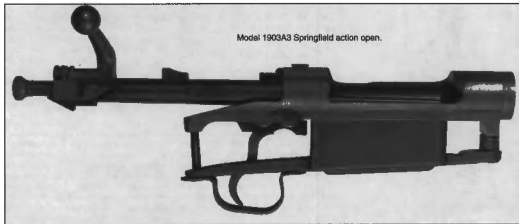
The National Match Model 1903 Springfields were stocked just like the regular Model 1903 rifle, first only with straight gripped stocks, but later on with the Type-C pistol grip stock.

The NRA Sporter

The first Model 1903 Springfield "Sporter" was made at Springfield Armory at the request of, and for, Theodore Roosevelt, then President of the United States. It was built on receiver No. 0009 in 1903. There is a full description and drawing of this rifle in the book *The 03 Springfield*. Roosevelt used this rifle on an African hunting trip and liked it. Some of his friend, hearing of this, also wanted Springfield sporters. Somehow, the late Captain E. C. Crossman obtained, about 1911, enough Model 1903 Springfield parts so that four sporting rifles could be assembled. The gunsmith work was done by Louis Wundhammer of Los Angeles, Calif. The well-known author Stewart Edward White got one of them.* Both White and Crossman wrote enthusiastically about these rifles, and pretty soon others wanted to purchase the 03 military rifle for sporterizing. As a result of this, in 1910 the Model 1903 Springfield military rifles were made available to members of the National Rifle Association.

In the early 1920s the NRA Sporter was developed and first released for sale to NRA Members through the DCM (Director of Civilian Marksmanship) in 1924. It was officially designated the "U.S. Rifle Cal. 30,

*It is a Rock Island Arsenal specimen, serial number 166,436, and the original barrel is dated February, 1910.



Model 1903A3 Springfield action open.

An attractive lightweight Springfield hunting rifle from the author's workshop. The remodeled Type C Springfield stock is fitted with a recoil pad and pistol grip cap. The Weaver K-4 scope, mounted in the quick detachable Weaver side mount, places the scope very low over the receiver. The action is fitted with the Numrich speed-lock unit. The one-inch carrying sling is attached with Sliih lightweight swivels to studs in the buttstock and barrel. The Type C stock is thick enough through the butt so that a cheekpiece can be left when trimming the stock.



Style NRA." (Note: Previous to the release of the NRA Sporter, Springfield Armory had developed 22 rimfire rifles based on a modified Model 1903 action. The last version of this rifle was the Model 1922 M1 Springfield. It was made with a sporter-type stock having a full pistol grip, high comb and a sporter-length forend with a barrel band. Since these rifles are rimfires, I have not included them in this book, but they are covered in full detail in *The '03 Springfield*.) The NRA Sporter was made up using an action of National Match quality, a star-gauged barrel, fitted with the Model 1922 M1 stock and a Lyman No. 48S receiver sight. Like the National Match Springfields, they were built on both Springfield Armory and Rock Island Arsenal actions. Many of them were marked on the tang of the guard with the ordnance "flaming bomb" mark, with the letters NRA below it. Only about 7000 of these fine sporters were sold before sales were suspended in 1933.

The NRA Sporters, officially introduced 15 November, 1924, were finished like the National Match 03s as far as the receivers and bolts were concerned, and all were star-gauged. These handsome half-stock Springfields were—in the opinion of many—the finest 03s ever made available to the shooting public.

At Rock Island the last receivers were made in about 1920 or possibly shortly afterwards. Apparently, the last ones made there did not have serial numbers. However, some of these receivers were used in assembling rifles in the Springfield Armory and then given serial numbers. According to *Hatcher's Notebook* the last 03 receiver made at the Springfield Armory was in 1939, serial number 1,532,878. Production of the 03 was resumed again in November, 1941, by Remington Arms Co., in Ilion, N.Y. They produced 348,085 before switching over to the Model 03A3 in May, 1942. Remington began their serial numbering with number 3,000,001.

The Model 1903A3 Action

The "A" in the 03A3 designation means "Alternate," and is thus the third alternate of the 03 rifle. To fill in the gap in the sequence, I should mention the 03A1 and the 03A2 versions, although they have no importance in this since both had the regular 03 action. The 03A1 Springfield rifle is an 03 rifle fitted with a pistol grip stock—there is no difference in the action. The 03A2 Springfield was a standard 03 action and barrel assembly with sights removed and bronze bushings fitted on the barrel, so that the assembly could be mounted in the bore of a tank cannon or artillery piece for subcaliber practice.

The 03A3 action was a "hurry-up," or simplified version of the 03 action. Here is a list of changes found on the 03A3 that distinguish it from the 03 action: 1) the old 03 rear sight on the barrel was discarded and a male dovetail base was milled on the receiver bridge for the installation of a new rear sight. This rear sight was an aperture sight ruggedly made and had provisions for windage and elevation adjustment; 2) the trigger guard/magazine box was formed from sheet metal, pressed, folded, and spot welded together; 3) the magazine follower was made from a sheet-metal stamping; 4) some intricate milling cuts on the receiver were omitted, for example, no cuts were made for the bolt-stop; 5) some milling cuts were also omitted on the bolt in the final period of manufacture—for example, the safety lug was left a rectangular block and was not milled down in front to match the extractor; 6) the hole in the tang for the rear guard screw was drilled through completely; 7) the gas vent hole in the extractor and in the right side of the receiver were omitted, and instead a large gas vent hole was drilled in the left side of the receiver in line with the gas vent holes in the bolt; 8) the barrel bands, the buttstock swivel and the buttplate were roughly made stampings.

Because of the need to turn out 03A3 actions speedily, previous manufacturing tolerances were increased. As a result of the increase 03A3 actions are much rougher and looser than the 03 actions. This is most noticeable on the outside finish of receiver and bolt. 03A3 bolts are usually very rough, with the bolt body turned to a smaller diameter around the safety lug section than elsewhere, leaving two or more pronounced ridges on the bolt.

The Model 1803A4 Action

The Model 03A4 rifle was made up as a sniper rifle and fitted with a telescope. It was made by Remington in 1943 and 1944. The 03A4 action is the same as the 03A3 except that the receiver ring and bridge are drilled and tapped with two 8 x 40 holes to accept the Redfield Jr. scope mount base, and the bolt-handle shank is altered to clear the eyepiece of the scope.

Low or High Number

Up to 1918 the receivers and bolts of the 03 actions were made of a single heat-treated carbon steel. Some of these actions have been known to burst for no accountable reason when fired. At Springfield Armory, beginning with action number 800,000, a new heat-treatment method, called the "double heat-treatment," was started which resulted in the actions (still made of carbon steel) being much stronger and safer than before. Thus

rifles made at the Springfield Armory (all Springfield receivers are marked with location of manufacture) with a serial number above 800,000 are the so-called "high-numbered" Springfields, and those with a lower number are the so-called "low-numbered" ones.

At Rock Island the new double heat-treatment was started at about action number 285,507. This is the dividing number between the low- and high-numbered actions made at that arsenal.

To repeat, 03s made at Springfield numbered below 800,000 and those made at Rock Island numbered under 285,507 are to be considered "low-numbered" actions. All others, including the 03s, 03A3s, and 03A4s made by Remington, and the 03A3s made by Smith-Corona are "high-numbered" ones. However, all of these "high-numbered" actions were not made with the double heat-treated carbon steel. A new steel was introduced called "nickel steel" since it contained some nickel.

In the latter part of 1918 at about action number 319,921, Rock Island Arsenal began using the new nickel steel for part of their receiver and bolt production, but continued at the same time to make some of these parts from carbon steel. It is thought that the receivers made of nickel steel were stamped with the letters NS in front of the receiver ring. However, in rebarreling a number of the Rock Island actions in this serial number range, I have never encountered these letters. It is sometimes possible to guess which steel is used by a file test since the nickel steel is softer and cuts more easily than the double heat-treated carbon steel. Actually, there is little difference in regard to action strength, safety and reliability whether an action is made of the double heat-treated carbon steel or nickel steel. In my opinion one is as good as the other.

In 1927, at action number 1,275,767, Springfield Armory changed to nickel steel for all subsequent production. The first 03 actions Remington made were of the same nickel steel as that used by Rock Island Arsenal and Springfield Armory. The last of the Remington-made 03s, all of their 03A3s and 03A4s, and the 03A3s made by Smith-Corona were made of a slightly different nickel steel alloy, one having less nickel, plus some molybdenum.

The low-numbered actions which are made of the single heat-treated steel are not so desirable, since the receivers are very hard and tend to be brittle. When these receivers fail, instead of stretching or giving, they usually break apart or shatter. The double heat-treated carbon steel receivers, however, have a very hard surface with a softer and very tough inner core. The receiver ring

on these actions will usually stretch a bit under extreme pressure before they break. Because of their very hard surface, these actions are usually the easiest to operate, especially if the contacting surfaces of the main moving parts are honed or polished as were the National Match and Sporter actions. The nickel steel actions are probably equally as strong and safe, or more so, than double heat-treated carbon steel actions, and under extreme stresses the receiver ring is more apt to stretch and swell than to break apart. However, because the surface is not as hard as carbon steel, nickel steel actions are somewhat "sticky" and the action cannot be operated as easily.

The high-numbered Springfield actions are strong—that's a fact. They are suitable for many cartridges which have a normal working pressure up to 55,000 psi. But how strong and safe are the low-numbered 03 actions? This I cannot answer. When made, they were proof tested with loads developing 70,000 psi, and very few failed in this test. Interestingly, many low-numbered rifles were kept in service until after 1945, and many of them were rebarreled by various government arsenals during WWII.

Apparently, they were considered safe. The fact is that only a very few of the low-numbered actions burst, and some of these for such known causes as a plugged bore. Some experienced gunsmiths feel these actions are safe enough to be used with cartridges that develop up to about 50,000 psi breech pressure, provided the rifle has minimum headspace. As for me, I would limit this action to moderately pressured cartridges like the factory-loaded 257 Roberts and 7x57mm Mauser.

Markings, Markings and Serial Numbers

Springfield Armory at Springfield, Mass., manufactured the 03, Mark I and various 03 match rifles from 1903 through 1939 with numbers from 1 to 1,534,878. Not quite this many rifles were actually made, since some of the receivers (the only part of the rifle stamped with a serial number) were used in tests and destroyed, and some were held over for replacement parts. The receiver ring of these rifles was marked:

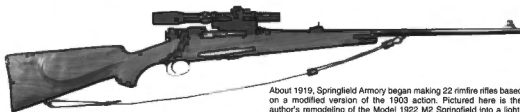
U.S.
SPRINGFIELD
ARMORY
MODEL 1903
(Serial #)

The Mark I rifles were marked:

U.S.
SPRINGFIELD
ARMORY
MODEL 1903
MARK I
(Serial #)

A featherweight (6.5 lbs.) remodeled 1903A3 Springfield sporter rechambered for the 308 Norma Magnum cartridge. The stock is reshaped and trimmed Type C (pistol grip) Springfield stock fitted with a Pachmayr recoil pad and pistol grip cap. Work was done by the author.





About 1919, Springfield Armory began making 22 rimfire rifles based on a modified version of the 1903 action. Pictured here is the author's remodeling of the Model 1922 M2 Springfield into a light-weight small game rifle. The 3x Hensoldt scope is carried in a quick-detachable Griffin & Howe side mount.

Some of the 03A2 Springfield receivers (or complete actions or barreled actions) were released into civilian hands, most likely by the arsenals as replacement receivers. These receivers are marked:

U.S.
SPRINGFIELD
ARMORY
MODEL 1903-A2
(Serial #)

Rock Island Arsenal at Rock Island, Ill., manufactured 03 rifles numbered from 1 to 346,779 (for spare parts this arsenal produced receivers numbered over 445,000), from 1904 to 1913, and from 1917 to about 1920. The receiver ring of these rifles was marked as follows:

U.S.
ROCK ISLAND
ARSENAL
MODEL 1903
(Serial #)

The Remington Arms Co., at Ilion, N.Y., made 03 rifles numbered from 3,000,001 to 3,348,085 from November, 1941 through May, 1942. The receiver ring of these rifles was marked:

U.S.
REMINGTON
MODEL 1903
(Serial #)

Remington 03A3 rifles made from May, 1942 through February, 1944 have serial numbers falling within the following blocks: 3,348,086 to 3,607,999; 3,708,000 to 4,707,999; 4,992,001 to 5,784,000. Not all of these numbers were used, however, and production was halted at about number 4,169,000. Total production probably did not exceed 345,000. The receiver ring of these rifles was marked:

U.S.
REMINGTON
MODEL 03-A3
(Serial #)

Remington 03A4 sniper's rifles made from February, 1943 through March, 1944 have serial numbers falling within the following blocks: 3,407,088 to 3,427,087; 4,992,001 to 4,997,045; 24,000,000 to

24,002,920. Production was stopped before all of these numbers were used. Total production was about 26,653. The 03A4s numbered within the first two blocks were marked on the left side of the receiver ring below the scope mount base:

U.S.
REMINGTON
MODEL 03-A3

The serial number was stamped on the right side of the receiver. The "Z" series were similarly marked, but with the model designation changed to:

MODEL 03-A4

L.C. Smith-Corona Typewriters, Inc., made 03A3s from October, 1942 through February, 1944, with serial numbers within the following blocks: 3,608,000 to 3,707,999; 4,708,000 to 4,992,000. Production was stopped at rifle number 4,845,831. The total number produced was about 234,500. The receiver rings were marked:

U.S.
SMITH-CORONA
MODEL 03-A3
(Serial #)

This completes the list of manufacturers who produced the 30-06 Springfield military rifles. In all cases the actual number produced was less than the figures indicate through loss of receivers in tests, etc.

The only other noteworthy markings on these rifles are on the top of the barrel, just behind the front sight. Here the initials of the organization that made the barrel and the month or year of manufacture were stamped. For example, SA 6-12 means that the barrel was made by Springfield Armory in June, 1912. Barrels made by Remington were marked RA, Rock Island barrels were marked RIA, Smith-Corona barrels were marked SC, Avis Rifle Barrel Co. barrels were marked AV, Johnson Automatics barrels are marked JA, and Sedgley barrels were marked with an S within a circle. The date on the barrel does not necessarily indicate the date of manufacture of the entire rifle, since it was standard practice for arsenals to replace worn barrels with new ones made many years after the receiver.

Non-Arsenal Receivers

All parts except the receivers have been available for the Springfield from the DCM and other sources for many years. The receiver, the only part carrying the serial number,* was considered the only non-expendable part of these rifles. It has never been commercially available. It was only available from the DCM on a replacement basis in exchange for a broken or low-numbered receiver. Since WWII, huge quantities of 03 and 03A3 parts have been sold to surplus arms dealers. Also some 03A3s have been offered for sale which are apparently assembled having non-arsenal-manufactured receivers. I have seen these rifles marked SANTA FE M-1903-A3, and with the receiver marked:

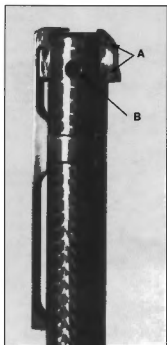
NATL. ORD.
MODEL 1903A3

and with a serial number over 5,000,000. I have also seen another such rifle marked NAT. ORD. CO. EL MONTE, CAL. Of course, such rifles cannot be considered to be authentic Springfield military rifles because only Springfield Armory, Rock Island Arsenal, Remington and Smith-Corona made the genuine Springfield, and none of these were numbered over 5,000,000. I have no reliable information as to the quality or strength of the National Ordnance Company receivers, so I can make no further comments on these rifles at this time.

Bolts

The bolt handles of all 03s made up to about 1908 of single heat-treated carbon steel, were turned straight down. When the double heat treatment of the bolts and receivers started in 1918, the bolts were made with a slightly swept-back handle which placed the grasping ball farther back. Later on, when the receiver and bolt were made of nickel steel, the letters NS were stamped on top of the square base of the bolt handle. The bolts made during the WWII

* Aside from National Match, NRA Spoor and M1922 rifles, which carried the serial number on the bolt as well.



Underside of the 1903 Springfield bolt head showing the two bolt-stop indentations (A) in the left locking lug and the single gas escape hole (B).

years, although made of nickel steel, were not usually marked NS.

The Parkerized Finish

Until about 1917 most of the outside metal parts of the 03 were browned or blued by various methods. Up to this time most of the metal parts were well finished, so most of the tool marks were removed. After 1917 most of the metal parts were finished by a process called Parkerizing, in which the parts were boiled in a solution of phosphoric acid. In fresh solution this would impart a dull matte, blue-black finish that was wear, glare and rust resistant. As the solution weakened or aged, the metals finished lighter in color, varying from dark or light greys to greenish shades. In the process of Parkerizing some iron phosphate crystals probably are deposited on the steel. This, plus the etching action of the phosphoric acid, produces a dull matte finish that does a good job of erasing or "covering up" tool marks left on the surface. To some this finish appears to be a film of some sort but it is actually part of the surface of the metal. The Parkerized finish cannot be removed with varnish remover, although the

metal can be made bright with some rust and bluing-removing solutions. When this is done the tool marks hidden by the finish are brought out. Therefore, if you like the dull Parkerized finish, but want to refinish it to a blue-black color, then merely blue the parts without doing anything else to them. However, if you dislike the Parkerized finish, whether or not you also want to smooth the metal, then polish the parts, polishing the Parkerized finish off at the same time. The receiver is the most difficult part to polish. If it does not have deep tool marks, a very pleasing finish can be obtained by polishing all the parts smooth except the receiver and then blue everything except the bolt.

Remodeling Tips

If a hunting scope is to be mounted low over the action, and this is the only practical way to mount a scope, it will be necessary to alter the bolt handle so it will clear the scope. I believe this is best done by sawing off the bolt and welding on a new forged handle with an electric welder. The shank and base of the bolt is very heavy, and, in my opinion, forging the bolt handle to a low profile is not the way to do the job.

A low-mounted scope also requires a different safety. Several commercial low-scope safeties are available, and it's much better to install one of these than to attempt to alter the original safety. There are also several commercial fully adjustable single-stage triggers available for the Springfields, some of which are made with a side safety. There are numerous other accessories available for the 03, such as trigger shoes, a quick-release floorplate button, one-piece safety firing pins, speed-lock firing pins and speed-lock mainsprings.

Do not remove the male dovetail base from the receiver bridge of the 03A3 and A4 actions. Practically all top scope mounts made for this action, and there are several to choose from, require this base to be intact to successfully attach the mount. There are also a couple of aperture sights made to attach to this base, although it would be hard to find a better aperture hunting sight than the original 03A3 rear sight. Other receiver sights made for the 03A3 such as the Lyman and Williams sights, have slides which nearly cover the base. However, if you have a 03A3 action with the sight base already removed, you will be restricted to using a side mount if a hunting scope is to be fitted. This is not a drawback since most side mounts are fully as reliable as any top mount.

I also advise against cutting off the flared end of the cocking piece in order to make the striker lighter and speed up the lock time. However, if this is done, it is essential that the striker rod be re-attached permanently to the cocking piece either with a sturdy cross-pin or by welding the two parts together. In this case,

it would be desirable to install a stiffer speed-lock mainspring.

Installing a one-piece safety firing pin in the bolt to replace the original two-piece pin does make the action safer to use. However, because these safety one-piece firing pins are quite light they come fitted with a very stiff mainspring. With a headless cocking piece and stiff mainspring, installation of the one-piece safety firing pin makes the action much "stiffer" to operate. One of the things I have always liked about the Springfield action, and especially so with the double heat-action and National Match actions, is that opening the bolt after firing a cartridge is quite easy compared to most bolt-action rifles. Installing a stiff mainspring spoils this smooth and easy bolt operation. For this I still prefer to use the original striker firing pin and mainspring.

Cartridge Choice

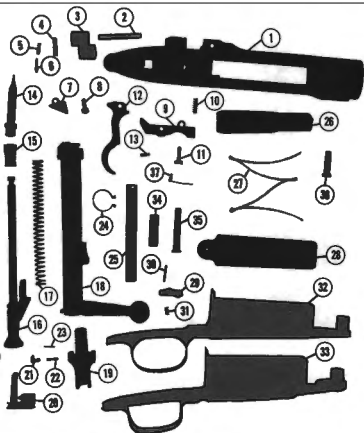
The 30-06 cartridge and the Springfield action were made for each other, but these actions will handle other cartridges equally well. For example, they are ideal for relabeling to cartridges like the 6mm, 257 Roberts, 7mm, 270, 280, 8mm and 35 Whelen. The unaltered Springfield magazine will also handle shorter cartridges like the 22-250, 220 Swift, 243, 284, 308 and 358. With these cartridges the feeding ramp may be improved by blocking off the rear part of the magazine with a piece of sheet metal riveted or silver soldered in place, and shortening the follower.

Some gunsmiths have modified the Springfield action to handle the long 300 and 375 H&H Magnum cartridges, but this requires removing vital metal from the feed ramp which, as with the 98 Mauser action, weakens the support for the lower locking lug. However, the high-numbered Springfield actions certainly are adequate for the modern short magnum cartridges like the 264 and 300 Winchester, 7mm Remington, 358 Norma and 458 Winchester. Altering the action to accept these cartridges requires only that the bolt face be opened up and the extractor hook shortened. Sometimes it will be necessary to smooth the cartridge guide lips in the magazine well to make these short magnum cartridges feed better into the chamber. It is also practicable to reamber the issue 30-06 barrel to the 300 Winchester Magnum if you want more power than the 30-06 provides. This is much more desirable than reambering to some so-called "improved" 30-06 cartridge. Incidentally, the issue barrel can also be set back and reambered for the 308 or rebarreled for the 35 Whelen cartridge—an excellent big game cartridge.

Springfield actions are entirely unsuitable for such small cartridges as the 222, 222 Magnum and 223 Remington—unless used as a single shot only.

Parts Legend

- 1 Receiver (top view)
- 2 Magazine cut-off pin
- 3 Magazine cut-off
- 4 Magazine cut-off screw
- 5 Magazine cut-off plunger spring
- 6 Magazine cut-off plunger
- 7 Ejector
- 8 Ejector pin
- 9 Sear
- 10 Sear spring
- 11 Sear pin
- 12 Trigger
- 13 Trigger pin
- 14 Firing pin
- 15 Firing pin sleeve
- 16 Striker
- 17 Mainspring
- 18 Bolt
- 19 Bolt sleeve
- 20 Safety
- 21 Bolt sleeve lock plunger
- 22 Bolt sleeve lock plunger spring
- 23 Bolt sleeve lock plunger pin
- 24 Extractor collar
- 25 Extractor
- 26 Follower
- 27 Follower spring
- 28 Magazine floorplate
- 29 Floorplate catch
- 30 Floorplate catch pin
- 31 Floorplate catch spring
- 32 Trigger guard/magazine M-1903
- 33 Trigger guard/magazine M-1903A3
- 34 Rear guard screw (stock) bushing
- 35 Rear guard screw
- 36 Front guard screw
- 37 Bolt-stop



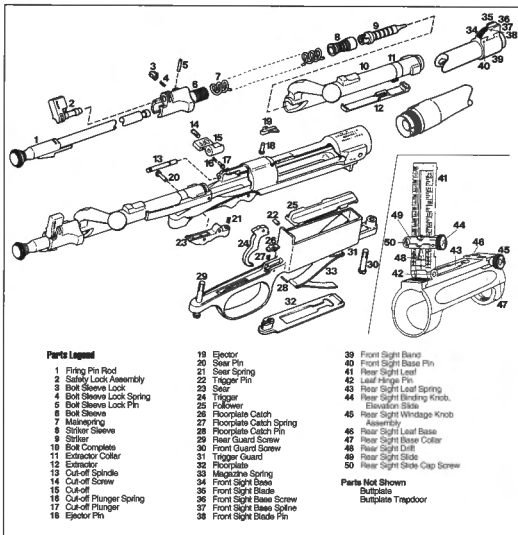
Model 1903 Springfield

Dimensional Action Specifications*

†Weight	45 oz.
Overall length	8.562"
Receiver ring dia.	1.305"
Bolt body dia.	.700"
Bolt travel	5.20"
Striker travel	.635"
Guard screw spacing	7.75"
Magazine well opening:	
Length	3.40"
Rear width	.530"
Front width	.560"
Bolt face recess:	
Depth	.055"
Dia.	.485"
*Approximate only, all models, in inches.	
†Models 1903A3 & A4	.52 oz.

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece machined steel forging with non-slotted bridge. Stripper clip charger guide milled in the bridge.
Bolt	One-piece, with dual-opposed forward locking lugs. A third lug on the bolt acts as a safety lug.
Ignition	Composed of striker, separate firing pin, mainspring and striker sleeve. Cocks on opening the bolt.
Magazine	Staggered-column non-detachable box, 5-shot capacity. Detachable floorplate.
Trigger	Curved and grooved. Non-adjustable, double-stage military type pull.
Safety	Rotary wing-type safety built into bolt sleeve, 180° swing from left to right, locking striker when in upright position, and both striker and bolt when swung to the right.
Extractor	One-piece, non-rotating Mauser spring type, attached to the bolt with a collar.
Magazine cut-off	Rearward bolt travel is halted by the rotary type magazine cutoff on the left rear of receiver when the left locking lug contacts it. (See text)
Bolt-stop	
Ejector	Pivoting type housed in left side of receiver bridge.



In the past, amateur and professional gunsmiths have used the Springfield actions successfully for building all sorts of rifles. It is most suitable for light- to medium-weight sporting rifles in standard calibers like the 270 and 30-06. It is equally a favorite for building all sorts of varmint rifles from lightweight combination varmint/deer rifles to medium- and heavyweight long-range varmint rifles. It has also been a longtime favorite with target shooters, made up like the National Match Springfields, or fitted with heavier barrels to

be used in the long-range matches. There are numerous accessories and all kinds and styles of stocks available to fit the action or rifle; there is no end to what can be done with them. Since Springfield actions are usually only obtainable by buying an entire rifle, and since these rifles are becoming scarcer each year, I suggest sticking with the standard cartridges and with the classic stock styles in remodeling or building up these rifles—especially if you want the rifle to have a reasonable resale value later. To emphasize this point, the clas-

sic rifles that Griffin & Howe and Sedgley used to build on these actions are increasing in value, while many, many thousands of amateurish and odd-ball remodeled Springfield rifles will never be worth more than the action alone—and this provided the action itself has not been ruined.

Takedown and Assembly

First, make sure the chamber and magazine are empty. To remove bolt: open and close the bolt and place the safety in the upright position;



1903 Mark I Springfield. Note oblong hole in left receiver wall.

swing the magazine cutoff to its intermediate position and remove bolt from the receiver.

To disassemble bolt: With safety upright depress the bolt sleeve lock plunger and unscrew the firing mechanism from the bolt. With firing mechanism removed, rotate the safety to the left. Grasp the striker sleeve between thumb and fore-finger and, while resting the striker knob on a table, pull down on the sleeve until the firing pin can be moved off the striker rod. This done, the striker rod can be removed from the bolt sleeve. Swing the safety up so the plunger in the safety is in line with the shallow slope on the plunger groove and, with a hammer handle, strike the safety to drive it to the rear. Remove the bolt sleeve lock by driving out the small cross pin. Remove the extractor by turning it as far as it will go to the bottom of the bolt and then slide it forward. *Do not remove the extractor collar unless necessary*, since it cannot be easily replaced without deforming it. Reassemble the bolt in reverse order. In reassembling the safety, use a small screwdriver to raise the safety plunger when sliding the safety to its final position.

Turn out the screw in the magazine cutoff and shake out its spring and plunger. Using a small screwdriver blade pull out the magazine cutoff pin. Reassemble in reverse order.

To remove the magazine floorplate, follower and spring, use a pointed tool (or hardball round) through the hole in the rear of the floorplate to depress the floorplate catch; now the floorplate can be slid back and released. Slide the follower off the follower spring and the follower spring out of the floorplate. Reassemble in reverse order with narrow end of the W-spring inserted into the follower.

To remove the stock, first remove the barrel bands and handguard. Turn out the two trigger guard screws, lift the barrel and receiver from the stock and pull the trigger guard/magazine from the bottom of the stock. Remove trigger assembly by pushing out the rear and trigger pins. To remove the ejector, drive out its pin from the top (although it has a slotted head, it is not a screw). Reassemble in reverse order.

The barrel is usually screwed very tightly into the receiver; make no attempt to remove it unless the proper tools (barrel vise and action wrench) are available. The rear sight base of the 03 is held in place on the barrel by a small cross-pin. This pin is located in the bottom forward part of the base and is hard to find. Drive out this pin and the sight base can be driven forward, off the barrel. The rear sight on the 03A3 is driven on to the dovetail base on the receiver bridge and then staked in place. It is difficult to remove this sight without damaging it, but if it is not to be used again the best way to remove it is to saw through the windage screw to remove the windage base, and then saw crosswise through the base over the center of the dovetail base. Then it is easily slid off.

Comments

I believe that almost everyone would agree that the first-choice Springfield action would be the Springfield Armory-made 03 National Match or the DCM Sporter version made at about the same time. Either will be extremely hard to find! I'd rate the rest in this order: 1) SA 03 of double heat-treated steel; 2) SA 03 of nickel steel; 3) SA 1903 Mark I; 4) RJA 03 of double heat-treated steel; 5) RJA 1903 of nickel steel; 6) Remington 1903; 7) Remington 03A4; 8) Remington 03A3; 9) Smith-Corona 03A3; 10) Low-numbered SA 03 and 11) Low numbered RJA 03.

Given a choice of either the preferred 03 Springfield actions or one of the better models of the 98 Mauser military actions, I tend to favor the Springfield. There are some things I do not like in either action, but for building a trim easy-to-operate sporting rifle chambered for a cartridge like the 6mm, 270 or 30-06, I'll take the Springfield. My reasons are: the Springfield action is easier to operate for fast repeat shots; less effort is required to lift the bolt handle on opening the action and pushing the handle down on closing the action. Feeding is generally smoother. I like the shape, size and placement of the trigger guard bow better. I also like the Springfield tang better; this feature, plus the slightly lowered angle of

the trigger guard bow, allows a trimmer pistol grip to be made. I also prefer the Springfield action over the Mauser 98 for building a target rifle for several of the same reasons.

For use with any of the hot wildcat or bolted-head magnum cartridges, I prefer the Mauser over the Springfield because I feel a bit safer behind the latter.

The Springfield action would be a better one if more Mauser features had been copied, including the one-piece safety and firing pin. The Springfield action also would have been better, in my opinion at least, had the safety lug been omitted and its function incorporated with the bolt handle engaging in a notch cut into the tang. This would have allowed a lower receiver bridge.

I've often wondered why Remington did not continue to make Springfield actions after WWII as they did with the 1917 Enfield action after WWI. Certainly the Springfield action has always been more popular and more desirable than the 1917 Enfield action and, had they continued to make Springfield actions of the quality of the old National Match actions, and made them available separately along with assembled rifles of different styles, I believe they would have found a very good market. Instead they introduced the Models 722 and 721 rifles.

The 30-06 Cartridge

Introduced in 1906, the 30-06 (pronounced "thirty-oh-six") cartridge seems to be as popular today as it ever was. At first it proved to be an outstanding military cartridge and, not long afterwards, loaded with suitable hunting type bullets, it proved to be one of the finest cartridges for hunting all North American big game. Lastly, loaded with match-type bullets and fired in target rifles, it set many long-range accuracy records. Now deemed obsolete by most military men for military use, it is—and probably will remain forever hence—a most popular and effective hunting cartridge for all thin-skinned big game animals, and as a top contender in any long-range match competition. It is the ideal cartridge for the Springfield 1903 actions.

Part II

Commercial

Rifles & Actions

Commercial Rifles & Actions

Anschutz Classic Centerfire Rifle	161-165	Mossberg Model 800	312-316
Blank Custom Rifle	166-168	Newton Original Tumbolt	317-322
Blaser Model R84 Takedown		Omega III	323-327
Rifle	169-173	Remington Model 788	328-333
Brno (Czech) Sporting Rifles	174-181	Remington Model Seven Carbine & Model 700 Mountain Rifle	334-341
Browning A-Bolt II BOSS Rifle	182-187	Remington Models 30, 30S and 720	342-344
Browning BBR Rifle	188-193	Remington Models 721, 722, 725, 700, 600, 660 and 40-X	345-357
BSA Royal, Majestic, Monarch, Hert's U9 Rifles	194-206	Ruger Original Model 77	358-366
Champion Firearms, Inc.	207-211	Ruger Model 77 Mark II	367-374
Colt Sauer Rifle	212-219	Ruger Model 77/22 Hornet	375-380
Cooper Model 38 Centerfire Rifle	220-224	Sako Rifles	381-395
Dakota Arms Model 76	225-229	Savage Model 1920	396-401
FN Actions & Rifles	230-236	Savage Model 23B, C & D	402-408
French Model 36 MAS Sporter	237-239	Savage Models 40 Sporter & 45 Super Sporter	409-412
Golden Eagle Model 7000	240-243	Savage Model 110 Series	413-423
Hert's Plinker Rifle	244-245	Savage-Stevens Model 340	424-427
Husqvarna and Smith & Wesson Rifles	246-251	Schultz & Larsen Rifles	428-433
Husqvarna Model 8000	252-255	Smith & Wesson and Moesberg Model 1500	434-439
Interarms Mark X Mauser	256-260	Sportco Model 44 Target Rifle	440-443
Interarms Mini-Mark X	261-266	Steyr-Mannlicher Model SL Rifle	444-449
Ithaca Model LSA-55	267-271	Texas Magnum Rifle	450-453
Kimber Model 82 Hornet	272-279	Tradewinds Series 600 Action	454-458
Kimber Model 84	280-281	Weatherby Mark V Rifle	459-464
Klinguenther Improved K15 Insta-Fire	282-286	Weatherby Vanguard Rifle	465-469
Krico Model 300 Hornet	287-291	Winchester Model 43 Rifle	470-474
Mathieu Left-Hand Rifle	292-295	Winchester Model 70 Classic	475-479
Mauser Two-Shot Shotgun	296-299	Winchester Model 70 Post-64	480-486
Mauser Model 98 Sporters	300-304	Winchester Models 54 & 70	487-497
Mausers, Miscellaneous Commercial	305-311		



Anschutz Classic Centerfire Rifle

MOST SMALLBORE TARGET shooters are familiar with the line of fine Anschutz target rifles, but I wonder how many shooters know that Anschutz also makes several excellent centerfire varmint rifles? Well, they do, and although Anschutz has been making a centerfire rifle for a number of years, the one I want to describe in this chapter can be considered a new model. It is the Model 1432D Classic, in calibers 22 Hornet and 222 Remington. It is an ideal rifle for anyone who desires an afternoon of leisurely shooting at paper targets and taking a varmint now and then at ranges up to 200 yards or so. It is the rifle for the shooter who demands quality and accuracy, and who also is a handloader. It is a rifle every shooter can be proud of.

Anschutz rifles are made by the firm of J. G. Anschutz in Ulm, Germany. Julius Gottfried Anschutz began his arms making business four generations ago and, except possibly for the war years, the firm has been in business since. For the most part their line of firearms has been limited to 22 rimfire sporting and target rifles. They were once marketed under the JGA name or trademark. Anschutz target rifles have long been famous for their accuracy. The firm also makes precision air rifles. The quality of Anschutz rifles has always been high. There are no low-cost Anschutz rifles, and like their target models, their sporting models are considered by many as top quality. And this opinion also applies to the centerfire rifles bearing the Anschutz name.

The Anschutz Centerfire Rifle

In 1982 there were only two Anschutz centerfire rifles, the 1432D Classic and the 1432D Custom in two calibers and they differ mostly in the stock styling and barrel weight. Both of these model numbers have been replaced by slightly different models but practically in all instances the action has remained the same and it is the action that is the main topic of this

book. Both can be rightfully classed as light-to medium-weight varmint rifles since they are chambered for varmint cartridges and are fitted with medium-heavy barrels, with the Custom model having the lighter barrel.

The action is a bolt action with a detachable box magazine holding four cartridges in 22 Hornet or three 222 cartridges. The trigger has a short single-stage let-off and it is provided with adjustments. The wing safety locks the striker and the bolt. Dual locking lugs are at the rear, and the receiver is both grooved and drilled and tapped for scope mounts. The 23.5" barrel has a slight shoulder contour and from that point tapers gently to the .820" recessed crowned muzzle. Everything is steel and all exposed parts except the bolt, which is polished white, are highly polished and blued.

The Classic model centerfire has an American-styled classic stock of dense European walnut. It has no white-line spacers, no raised comb or cheekpiece, flared pistol grip, beaver tail forend or an added forend tip. It does have ample wood throughout without a trace of bulkiness. It also has straight lines, hand-cut checkering, studs for detachable sling swivels, a hard plastic grip cap and buttplate, a perfectly level and smooth surface and a non-glare finish. It is not too unlike the splendid Model 77 Ruger stock. Weight is approximately 7.75 pounds. It is this Classic model as shown here that became one of the new Anschutz rifles for 1982. The Custom centerfire described below has been a standard Anschutz offering for quite some time.

It has a cheekpiece, raised roll-over comb, flared pistol grip with palm swell, and a schnabel-tipped forend. It also has skip-line checkering and a high gloss finish. Weight of this model is about 6.5 pounds. These two rifles in the 22 Hornet caliber were given the model designation number of 1432D Classic or Custom, while the same rifles in 222 caliber were given the designation of 1532P Classic or Custom.

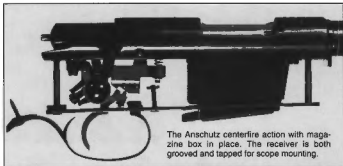
Of the two models, Classic and Custom, my preference is wholly toward the Classic. I like its weight, heavier barrel and stock far better than the lighter weight, slimmer barrel and rolled-comb stock on the Custom. I see little point in the roll-over comb and the other "custom" features which the Custom stock has. As for a choice of calibers, I chose the 22 Hornet simply because I figured this Classic Anschutz would give me the most accurate Hornet I have ever owned up to that time.

The Anschutz Action

The receiver is round, probably made from seamless steel tubing. The barrel shank is a shrink fit into the front of the receiver and anchored there by two cross pins, one at each side of the receiver ring. This method of securing a barrel to the receiver is seldom used except for 22 rimfire rifles. A thin recoil lug, patterned after the lug long used by Remington on their M721 and 700 series, is positioned between the barrel shoulder and the receiver. The breech end of the barrel is flat, although it has a narrow extractor cut on the right side of it. Behind the receiver ring there is a generous loading and ejection port, large enough for easily loading the rifle as a single shot. Below the loading port is the narrow magazine opening. There is plenty of receiver wall left on either side of the loading and magazine openings to leave the receiver more than amply rigid to support a full-floated barrel, and strong enough for the rear locking lug system. The rear of the receiver is machined with a recess to form shoulders for the locking lugs. The top of the

(Above) The Anschutz Model 1432D Classic in 22 Hornet caliber. It has a medium-heavy 23.5" barrel with a muzzle diameter of .820" which makes this 7.5-pound rifle ideal for a short-to medium-range varmint rifle. The no-frills classic styled stock is made of European walnut.

PART II: Commercial Rifles & Actions



The Anschutz centerfire action with magazine box in place. The receiver is both grooved and tapped for scope mounting.

receiver ring and bridge are grooved and also drilled and tapped for scope mounts.

The main part of the bolt is a two-piece arrangement: the long, non-rotating bolt body; and the bolt handle sleeve with its integral locking lugs, one of which is the root of the bolt handle. The bottom front half of the bolt body is grooved to ride over the magazine lips, leaving a ridge between the grooves to chase the top cartridge from the magazine. The face of the bolt is recessed approximately the thickness of the rim of the Hornet cartridge, although the rim of this recess is machined off at the bottom to allow the cartridge rim to slide under the extractor hook on being chambered from the magazine. The single extractor is a narrow claw hook positioned in a slot cut into the right side of the bolt head and it is tensioned and held in place by a spring-backed plunger.

The rear of the bolt body is turned to a smaller diameter and on it the bolt handle sleeve is fitted and rotates. The root or base part of the bolt handle forms one of the locking lugs, and the receiver is notched to receive it. A curved surface at the upper front corner of this notch serves to provide initial extracting power to the bolt on the uplift of the bolt handle. To assist in this, and to hold the bolt handle down, a spring-backed plunger is fitted into the front of the bolt handle base to bear against the front surface of the notch.

On the bottom rear of the sleeve is the second locking lug that fits into a matching recess in the receiver. This lug has a lengthwise groove cut into it to allow it to pass over the sear. To cock the striker, a cam notch is machined into the rear of the bolt handle sleeve.

The firing and safety mechanism was the work of a clever person—for me to describe it is high impossible, but I will try. The one-piece striker with its integral head is machined from flat stock and is very light in weight. There is a sleeve that slides over the striker and rests against the striker head; this sleeve has a projection on it, the function of which I will point out later on. Next comes the coil main-

spring that slips over the striker and against the sleeve, and then a small collar which, when in place and given a quarter-turn, holds the main-spring compressed on the striker.

The rear end of the bolt body is slotted. The assembled striker slips into the bolt, the flat striker head moves into this slot, and the projection on the sleeve projects upward behind the bolt handle sleeve. Behind the bolt handle sleeve comes a spacer or cover, a thin piece of steel tubing slotted at the bottom to fit over part of the striker head.

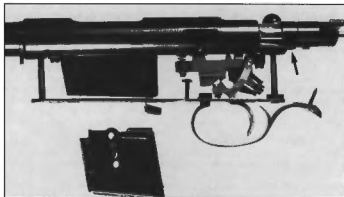
Then comes the safety, a complex bit of metal. It not only serves as the safety but also serves as the cover for the rear end of the bolt to hold the bolt assembly together, and it serves as the bolt lock. It is made of a single piece of steel shaped like a cup with a wing projecting from it. Inside the cup a divided collar has been machined to engage a matching collar on the very end of the bolt. The upper collar inside the cup contacts the projection on the striker sleeve when the safety is in place, thus, on the uplift of the bolt handle which will

draw the striker back, the sleeve will remain stationary and the mainspring will be fully compressed. Inside the cup there is also a rivet-shaped piece of steel and a coil spring that serves as the cocking indicator. When the action is cocked, the striker pushes the rivet back so its polished stem projects through a hole in the rear of the cup.

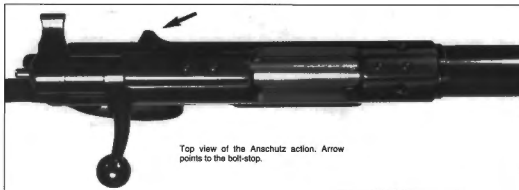
Assembled on the bolt, the wing of the cup safety is towards the left and it is disengaged when straight to the left. Pushing the wing down as far as it will go rotates the cup, so the lower collar inside it engages with the projection on the head of the striker to lock the striker and the bolt at the same time. Just how all this is done I have not figured out as yet. Anyway, it is an arrangement of collars, projections and camming surfaces that works. In addition to all of this, with the bolt removed from the receiver, and with the bolt handle sleeve turned to uncock the striker, the safety is then rotated counterclockwise a bit beyond the Safe position and the safety can be removed to disassemble the bolt.

Recessed in a slot through the left side of the receiver wall is the bolt-stop. This is a simple and small part that pivots on a pin and is tensioned by a small coil spring, with all of it within the receiver wall except the serrated end, whereby it can be released to withdraw the bolt. A groove along the left side of the bolt body to accept the front end of the bolt-stop serves not only as the stop, but also as a guide to prevent the bolt body from rotating. It is a simple arrangement and better than a trigger activated bolt-stop.

The Anschutz ejector is a separate part fitted inside the receiver and held in place by the screw which also holds the magazine clip and magazine in place. This part also serves to prevent the bolt body from rotating.



Left side of the Anschutz centerfire action showing the bolt opened and the magazine detached. Bolt travel is very short and the root of the bolt handle serves as one of the two locking lugs. Arrow points to the second locking lug below the bolt handle.



Top view of the Anschutz action. Arrow points to the bolt-stop.

The Anschutz trigger is comprised of three main parts: bracket, trigger and sear. These parts are mounted together on the bottom of the receiver—there is no housing. The bracket is fastened to the receiver by a pin and screw, and to it is pinned the trigger. Two adjustment screws are fitted to the trigger, one in the rear with a companion coil spring to provide weight-of-pull adjustment, and another in front to provide sear-engagement adjustment. This screw and the weight-of-pull spring contacts the bracket. The weight-of-pull screw can also provide over-travel adjustment if the trigger is adjusted to its heaviest pull, which on my M1432D Classic is 5+ pounds. If adjusted to a lighter weight, then there is no over-travel stop. I can adjust the trigger on my gun to a very crisp 3.5 pounds. The sear is pivoted on the same pin that holds the bracket, and it and the trigger are so made with a sear arrangement so that when the

action is cocked, the trigger holds the rear end of the sear up, which in turn holds the striker cocked. It is a good trigger but it is not meant to be taken apart as it is adjusted at the factory for the shortest, safest pull possible. The stock must be removed if you want to make a weight-of-pull adjustment.

The trigger guard plate is inletted flush into the bottom of the stock. A small screw holds it in place when the barrel and action assembly is removed. Two guard screws go through holes in each end of this plate and through the stock, thread into the bottom of the receiver and hold the barrel and action in the stock. The front end of the shotgun-styled trigger guard is attached to this plate with a threaded stud and nut, while the rear tang end of the trigger guard is inletted flush into the stock and held in place with a wood screw. Both the trigger guard and plate are steel, highly polished and blued.

Made of sheet steel, the magazine box is well designed and constructed. The bottom of the box is easily removed by depressing an exposed part of a wire spring. At the front of the box Anschutz has added a U-shaped piece of steel to not only reinforce the magazine but also to serve as a guide to hold the magazine in the rifle. Inside the magazine there is a follower with an arm hinged to it and to the rear of the box; a coil spring applies upward tension to the follower. A row of holes on each side of the box allows the shooter to count the cartridges inside.

Attached to the bottom of the receiver with screws are the two parts which guide and hold the magazine box in place. One part is the sheet metal shell or guide, properly centered over the magazine opening in the receiver—it is so shaped at the front to fit over the reinforcement guide spot welded on the front of the magazine box. This prevents the magazine from being inserted incorrectly and positively holds the magazine in proper alignment with the receiver and bolt. In the open rear end of this shell the magazine spring clip is positioned. It has a serrated fingerpiece which projects below the stock and trigger guard plate so that the magazine can be easily removed.

Markings

The Anschutz 1432 Classic rifle is marked as follows: Stamped on top of the barrel in one line is:

Anschutz Mod. 1432 Cal. 22 Hornet
FOR FACTORY LOADS ONLY

On the left side of the receiver is:

J. G. Anschutz GmbH Urm West Germany
Sle Inc, N.Y. N.Y.

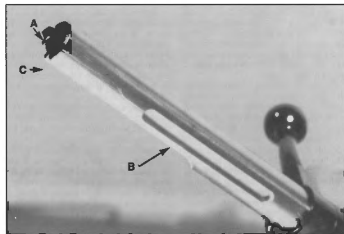
The serial number is stamped on the left side of the receiver ring and part of that number on the bolt. Proofmarks are stamped on the left side of the barrel breech, receiver ring and bolt.



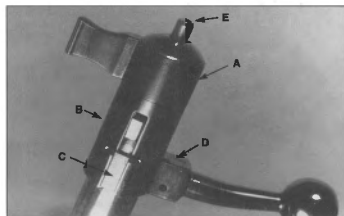
The Anschutz trigger has a short crisp trigger pull. Shown here are: (A) adjustment screw for sear engagement and (B) adjustment screw for weight of pull.



Close-up view of the Anschutz action in the Classic stock.



The Anschutz 1432 bolt head showing: (A) extractor, (B) bolt-stop groove, and (C) grooves to clear magazine lips.



Takedown and Assembly

Check to make certain the rifle is unloaded by removing the magazine and opening the bolt. Remove the bolt by depressing the bolt-stop on the left of the receiver and pulling the bolt out.

To disassemble the bolt, grasp the bolt body in one hand and rotate the bolt handle clockwise as far as it will go to uncock the striker. Next swing the safety down as far (counterclockwise) as it will go and pull it off the bolt. Now remove the cover sleeve, striker assembly and the bolt handle sleeve. The mainspring and the striker sleeve can then be removed by depressing the lock sleeve on the front of the striker until it can be turned, turn it one-quarter turn, and it and the mainspring and striker sleeve can be removed. Reassemble in reverse order.

To remove the barrel and action assembly from the stock, proceed as follows: Remove magazine and open or remove the bolt. Turn out the wood screw at the rear of the trigger guard, carefully lift the rear end of the guard from the inletting, and swing the trigger guard counterclockwise to expose the rear guard screw. Turn out this screw. Next, turn out the front guard screw, whereupon the barrel can be lifted partly out of the stock to allow it and the action to move forward slightly to allow the entire unit to be separated from the stock. If you want to remove the trigger guard plate from the stock, remove the small screw that is located in front of the trigger guard and lift the plate out. The trigger guard bow can be removed from the plate by turning off the nut that holds it on. Reassemble in reverse order.

The magazine box shell, magazine clip and the ejector can be removed from the receiver by turning out the two screws at both ends of the shell.

Very tight-fitting pins are used to attach and hold the bolt-stop, trigger mechanism and barrel to the receiver. Unless absolutely necessary, make no attempt to remove these parts, and especially not the barrel.

Comments

I have had a long acquaintanceship with the 22 Hornet cartridge and I have owned and used a number of rifles, both bolt action and other types, chambered for this small center-fire cartridge. Bolt-action Hornet rifles that I have used include the Savage Model 23D, Winchester Models 43, 54, and 70 and a custom rifle or two, one of which was a Model 98 Mauser that I converted into a 22 Hornet

(Left) Close-up of the rear part of the 1432 bolt showing: (A) safety/bolt cap, (B) cover sleeve, (C) grooved locking lug, (D) root of bolt handle which forms the second locking lug, and (E) cocking indicator.

repeater using some Model 70 Winchester Hornet parts. I've had a lot of fun with these Hornets. It was most popular in the late 1930s, then almost died out after the 222 was introduced in 1950, but after the mid-1970s it has gained back much of that early popularity. I believe this may be because the Hornet is our smallest reloadable, readily available, commercial rifle cartridge and, to practice energy saving and economy, shooters have sought out the little cartridge.

While I had fun shooting the Hornet bolt-action rifles, I never stayed with this cartridge because none of the rifles I used were as accurate as I demanded. The most accurate bolt-action Hornet I knew about belonged to a friend who would not part with it. It was a target grade Model 54 Winchester. Having not owned or fired a Hornet bolt-action rifle since about 1950, I believe that at long last I have a rifle that will meet my accuracy demands, and that rifle is my Anschütz M432D Classic. It has the weight and weight distribution that I like, and if I can judge its accuracy potential by the many Anschütz match rifles the target shooters are using in my area, my Anschütz Hornet rifle will be highly accurate.

Most of the weight of my rifle is in the barrel and that is where I want it. The chamber is perfect in fit, the trigger pull is perfect, and the lock time is very fast. If my Anschütz Hornet is fed the right bullet it cannot help but be accurate.

However, since becoming an owner of a Kimber M82 Special Grade 22 Hornet rifle, limited testing with factory loaded ammunition indicates that it might be more accurate than any 22 Hornet rifle that I have ever

owned. Moreover, it is by far the most handsome and most quality-built 22 Hornet that has ever graced my gun cabinet. The Kimber rifle is covered in another chapter.

There is one feature of the Anschütz centerfire rifle that I wish the German maker would change, and that is the method they use to fit the barrel to the receiver. The cross-pinning method that Anschütz has been using for so long a time, even on their highest priced target rifles, must be good. When I remarked to a friend that the barrel of his new \$800 Anschütz match rifle had the barrel held in place with couple of pins, he did not believe me. Yet, every Anschütz target rifle that I have seen tested was highly accurate. I do not know whether these rifles would be more accurate with the barrel threaded into the receiver, but I would feel better if they would use this method when making their centerfire models.

The action used for the centerfire rifles is almost identical to the rimfire action that Anschütz has been making for many years. It is a tried and true performer and Anschütz gets the most out of it. For use with a centerfire cartridge I would like to see the action redesigned a bit. For one thing, I would like to see the groove in the lower (or left) locking lug omitted. Secondly, I would like a sizable flat spot provided under the receiver ring and tang for a flat bedding area against the stock. An area 1/2 x 1 inch at both ends would be sufficient. This could easily be done under the receiver ring by a simple change in the construction of the recoil lug—and that is by making it similar to the one Browning uses in their BBR rifle as shown in another chapter.

And, of course, I'd like to see the barrel threaded into the receiver. These changes would add little cost to the rifle but in my opinion they would make an already good action a better one.

I have mentioned before the method Anschütz uses to secure the barrel to the receiver. What few Anschütz owners know and what I learned long after I became acquainted with Anschütz rifles was that, besides the two pins, the barrel is shrink-fitted, resulting in an extremely tight barrel fit into the receiver. Once the barrel is forced into a heated receiver it is a permanent fit. I learned this one day when I attempted to remove an Anschütz barrel and found that it could not be budged.

I particularly like the stock of my Classic rifle. It is clean of line and without frills. The pistol grip could be made a bit slimmer, but other than that it is an ideal stock for this rifle.

There you have it—next to the Kimber M82 Hornet my Anschütz rifle is one of the finest 22 Hornet caliber bolt-action varmint and target rifles you will ever lay eyes on.

The Anschütz firm is constantly making changes in their line of rifles. For a long time the action has remained more or less constant, but not so with the stock and other features. In 1994, they no longer listed a 1432D. However, they still make rifles in the 22 Hornet caliber and in other 22 calibers such as the 222 and 223. They most likely will continue making their fine rifles in these calibers for a long time to come. They will have different numbers, of course, and different stocks than on the Classic, but the action will most likely remain the same.

Left side view of the Anschütz Classic rifle.

Anschutz M1432D

Dimensional Action Specifications

Action length	7.9375"
Receiver length	7.750"
Receiver diameter	1.175"
Bolt diameter	.650"
Bolt travel (22 Hornet)	2.000"
Striker travel	.200"

General Specifications

Type	Bolt-action repeater.
Receiver	Round, one-piece machined steel, grooved, drilled and tapped for scope mounts, separate recoil lug between barrel and receiver.
Bolt	Non-rotating bolt, dual locking lugs at rear on the bolt handle sleeve.
Ignition	One-piece striker, coil mainspring, cocking indicator, cocks on upflit of bolt handle.
Safety	Wing safety on rear of bolt, locks striker and bolt.
Bolt-stop	Pivotal, mounted in left receiver wall.
Extractor	Claw type.
Ejector	Stationary, mounted on a block inside the receiver.
Trigger	Single-stage, adjustable for take-up and weight of pull.
Magazine	Single-column detachable box magazine.



Blank Custom Rifle

R.J. BLANK of Jackson, Michigan, is a skilled and experienced tool and die maker. He is also a talented firearms designer and custom rifle builder, as witnessed by the rifle illustrated here. This fine high-powered bolt-action rifle is just one of a number of similar ones that he has built. I have examined two of his rifles, and they were truly fine sporting arms in every detail.

I was unable to get much first-hand information from John Blank himself, either about him or his rifle—he evidently is a modest individual. Being a machinist and working in a place where metal working machines were available for his use, and being interested in high-powered rifles, he thought he could design and build a rifle that would be superior to anything that he could buy. And this is exactly what he did. He built his first Blank Sporter sometime during the 1950s. It was a success. That spurred him on to make more, with each one an improve-

ment over the previous one, and different from it in various ways. In succeeding years, he built twenty-one, some for himself, some for others. One of his rifles was built for Fred Huntington, founder of the RCBS reloading tool firm. The last rifle he built was in 1968, and since that time he has done no gunsmithing or rifle building. For lack of time and finances, he was neither able to promote his new rifle or action, or to commercially produce it himself. The Blank rifle shown here is dated 1963 and bears the serial number 116, which was the sixteenth rifle he made.

The heart of any rifle is its action, and that is the part of the rifle most every rifleman is most interested in. The Blank action is not only made with meticulous care, but even more important, the design is good—it was well studied and thought out. It has some standard and time-honored features as found in some of the best turnbolt actions ever

made, plus a few new and excellent features of its own, which all together make for a very excellent action for a high powered cartridge.

The Blank action is all steel. All of the important parts are machined from solid stock of the highest quality steel. Where necessary, the parts are properly heat-treated for durability, strength, safety, resistance to wear, and smoothness of functioning and operation. All parts are precisely fitted.

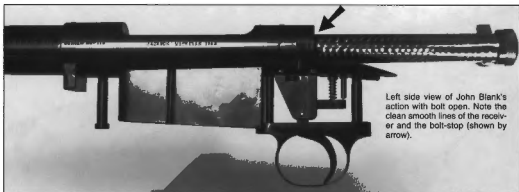
The receiver appears to have been machined from a single block of steel. It is round except for the heavy recoil lug on its forward end, a lug similar to that on the Model 70 Winchester. The barrel is threaded into the receiver ring, and its breech end is flat. All the many machine operations that had to be performed on and in the receiver, such as the bolt and locking lug raceways, locking shoulder recesses, magazine and loading port openings, and rear raceway, all are precisely done. The bolt-stop (of the pivotal Mannlicher-Schoenauer type) is neatly fitted in a slot in the rear left of the receiver bridge. The bolt is stopped on its rearward travel when the left (or top) locking lug strikes the bolt-stop. The receiver is drilled and tapped for scope mounts.

The bolt also appears to be machined from a single piece of steel, although the bolt handle may have been welded on. It has dual opposed forward locking lugs which engage behind solid locking shoulders in the receiver ring. The bolt handle root serves as the third, or safety, locking lug, for with the bolt

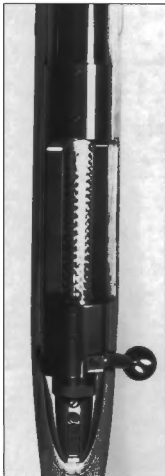


The John Blank turnbolt action. Three guard screws (two in trigger guard at rear of magazine and one in front of magazine) hold the action and barrel in the stock. It has a tang safety, adjustable trigger and inside-the-stock magazine box. It is a very strong and safe action, made entirely of modern steels.

(Above) John Blank's fine custom-built bolt-action sporting rifle. This particular one, which he built in 1963, is chambered for the 7mm Magnum cartridge. With 24" barrel and Claro walnut stock, this rifle weighs just 7 1/4 pounds. It has a four-shot hidden magazine.



Left side view of John Blank's action with bolt open. Note the clean smooth lines of the receiver and the bolt-stop (shown by arrow).



(Left) Top view of the John Blank action showing the sliding tang safety, trigger weight of pull adjustment screw and low profile bolt-stop. The receiver is drilled and tapped for scope mounts. The bolt handle is low in profile and its root serves as the third or safety locking lug.

(Right) Top view of the action with bolt opened.

closed it fits into a notch in the receiver. The bolt face is recessed to enclose the cartridge head. Fitted in the bolt head are the extractor and the ejector; the extractor being of the pivot hook type, and the ejector a spring backed plunger.

The bolt is drilled from the rear to accept the bolt sleeve and firing mechanism. A one-piece striker-firing pin is backed by a stiff coil mainspring. The firing mechanism parts are simple and sturdy, lock time is very fast, and ignition positive. The striker is cocked upon the upturn of the bolt handle. The upturn also provides initial extraction camming power as the root of the handle passes over an inclined surface on the rear of the receiver bridge. The bolt handle is of low profile so that it will clear the eyepiece of a low-mounted scope; no detail is overlooked.

The trigger mechanism is securely pinned to the bottom of the receiver. It has a crisp single-stage pull and is adjustable for weight of pull and over-travel. The adjustment screws are accessible from above in the tang. The rear screw is the trigger-stop or over-travel adjustment; the forward one the weight of pull adjustment. The trigger is well curved and well placed in the rear of the trigger guard.

A sliding-type safety is located at the rear of the tang in easy reach of the shooter's thumb. Engaged, it locks the trigger, sear and bolt, and it is convenient to operate, positive, and silent.

The Blank rifle features a Mauser-type



PART II: Commercial Rifles & Actions



Left-side view of the Blank Custom rifle.

Measured Action Specifications

Receiver length	.....8.000"
Receiver diameter	.....1.340"
Bolt diameter	......690"
Bolt travel	.....4.250"

General Specifications

Type	..... Bolt-action repeater operated by bolt handle.
Receiver	..... One-piece machined steel with integral recoil lug and solid bridge.
Bolt	..... One-piece machined construction with dual-opposed forward locking lugs. Bolt handle serves as safety lug.
Extractor	..... Claw type.
Ignition	..... One-piece striker, coil mainspring, cocks on uplift of bolt handle.
Safety	..... Sliding tang safety, locks trigger, sear and bolt.
Bolt-stop	..... Pivotal, mounted in left receiver wall.
Ejector	..... Plunger type in bolt face recess.
Trigger	..... Single-stage, adjustable for weight of pull.
Magazine	..... Staggered-column, non-detachable box magazine.

The bolt of the John Blank rifle has a recessed face and solid dual-opposed locking lugs.

staggered-column nondetachable box magazine, with the magazine box made of heavy sheet steel. The follower is milled. Blank has made some of his rifles with a hidden magazine, as in the rifle illustrated here. In this case, the magazine box is inletted in to the stock and there is no floorplate, just a separate trigger guard. With others, he employed a conventional trigger guard/magazine plate with a quick-release hinged floorplate. In both cases, the barreled-action is held in the stock by three guard screws; one up front and two for the trigger guard, just as with the Model 70 Winchester.

No doubt there were numerous mechanical variations in the twenty-one actions that Blank made, with features that differ slightly in detail from the action described here. Perhaps he made some actions shorter than others, and perhaps with a slightly different trigger, safety, etc. I am sure that all of them were as trim in outline as the one shown here, smooth in operation, very functional, and very strong and safe. I am also sure that all were equally well made and finished; with no machine marks showing and the metal surfaces level and very smooth.

The markings of the twenty-one rifles that

Blank made may also vary. On the rifle shown here, the markings are as follows. Stamped on the left side of the receiver is:

MADE BY R.J. BLANK
JACKSON, MICHIGAN 1963

The serial number is also stamped on the receiver (Numbering was started with #101), and the caliber stamped on the barrel breech.

Blank probably used barrels from different makers, but the barrel on the rifle shown here was made by Hugh Wineland, of West Unity, Ohio. Blank also used a good grade of walnut to make the stocks for his rifles and made his stocks along the classic Griffin & Howe style. On the rifle shown here, the stock work is as good as his metal work.

I have no idea what Blank charged for making one of his fine rifles, or what one might be worth today. Serious collectors of classic custom built turnbolt magazine rifles will surely become interested in the Blank rifle, but they will also surely find it almost

impossible to find, let alone acquire. But unlike similar sporting rifles made by some of the well-known custom gunsmiths such as Hoffman and Griffin & Howe who used actions built by others, John Blank built his rifles or actions which he designed and made himself—an action which is every bit as good or better than any of the turnbolt actions that these other gunsmiths used. This makes the Blank rifle unique.

As few in number as these Blank rifles are, most of them will be around for a long time. Most of their present owners realize that they have a rare breed and a thoroughbred, and will see to it that the rifle is taken care of. But as time passes, the rifles will pass on to different owners. Fifty or more years hence, gun writers and arms historians will certainly receive inquiries about rifles marked, "R.J. Blank, JACKSON, MICHIGAN"—this book in their library will give them the information they will need.



AFTER I HAD ordered a Blaser rifle through my dealer and waited two months for some word about it, I called the importer and politely asked about it.

"Oh," he answered, "I have your order right here. You ordered one Blaser Model R84." Then he informed me that there could be a few weeks more delay and then your "Blaser" will be here. His voice sounded as if he was German or Swiss. The "A" is pronounced as in "Ah Ha". So now you know how they pronounce the name of this—a most interesting and truly different turnbolt repeating rifle.

Marked on the right side of the barrel extension on this rifle is the following:

**Model R84 Made In Germany
2/06473**

On the left side of the receiver is marked the caliber, "Caution! Read manual before use!", and below that German proofmarks. On the top rear end of the receiver, the model number and the serial number appears again.

In this book, there are five bolt-action rifles described having two-piece stocks, and they are the Blaser, Lee-Enfield, M96/40, M36 MAS and the Omega. There are two rifles described which are takedown, and they are the Blaser and the Original Newton.

The Blaser is a takedown rifle, which means that the barrel can be easily separated from the rest of the rifle. With the Blaser, it is only necessary to loosen a single screw to take it down. To take the rifle down, the following must be done, and when taken down the rifle is separated into four parts: namely the barrel, bolt assembly, stock and receiver, and magazine. The bolt assembly comes off first, which is easy to do. Next, one screw is loosened and the barrel and its barrel extension slips off the receiver, to which the stock

and forearm are attached. Then, turn the receiver stock assembly over and the magazine drops out. If the rifle has a 23" barrel, it and the barrel extension have a length of 23.5", and if there is a scope mounted on the barrel, the total length may run up to six inches more. The receiver and stock assembly is about 28.5" in length so that, taken down, the rifle will fit into a case about 32" long.

I am not at all keen about takedown rifles, and especially not high powered ones, and while I do not necessarily believe that this rifle was especially designed to be a takedown, it was just a natural outcome in the design. Here is a takedown rifle where the breeching system is not affected by constantly being taken down, a problem that was common with takedown rifles of the past. There is nothing to wear out and loosen because the breech bolt with its three locking lugs locks the breech block assembly to the barrel. Unique is the word for it because it is entirely unlike any turnbolt rifle action I have ever seen. There is only one rifle in this book with such an entirely different action that I am at a complete loss as to what to call it, and that rifle is the Blaser. And having a different action, it also has many features not found in any or all the rifles herein described.

As we shall see later on, this rifle is not a toyish designed or amateurish manufactured one, but an honest-to-gosh he-man's hunting rifle. The only reason I bought this rifle was so that I could include it in this book. To be sure, it is a one-of-kind rifle as you will see. I do not know who designed it, or if it is patented, or when it was first made. All I know about it is in the rifle itself.

Blaser Specifications

The 1994 literature I received on this rifle,

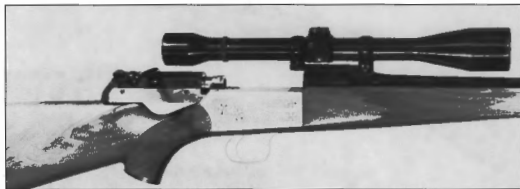
before ordering one, listed the R84 as being available in several grades and each one more expensive than the other.

The Model R84 was listed as being made in fourteen calibers, and they are 22-250, 243 Win., 6mm Rem., 25-06, 270 Win., 280 Rem., 30-06, 257 Weatherby Mag., 264 Win. Mag., 7mm Rem. Mag., 300 Win. Mag., 300 Weatherby Mag., 338 Win. Mag. and 375 H&H. Barrel length: 23" for standard calibers and 24" for magnum calibers; approximate weight with scope mounts 7.25 lbs. Stock: the two-piece stock is Turkish walnut, finished in oil, hand-cut checkering and fitted with a recoil pad and pistol grip cap; scope mounts: the rifle is furnished with a mounted scope mount base and one inch rings with mount base attached to barrel extension. Rifle is available in either right- or left-hand models. Available in three grades: Standard, Deluxe and Super Deluxe.

The Blaser Action

My Blaser rifle is the Model R84, and it will be the one I will describe in as much detail as possible without completely disassembling the bolt and trigger assemblies. That hindered me greatly, and what caused me to abandon a more detailed description was that whoever assembled it for the final time at the factory must surely have used Lock-tite on the screws and tightened them, so that I found it all but impossible to loosen

(Above) The Blaser R84. Made in Germany, this rifle is the only modern takedown described in this book. Chambered for a wide number of American and European cartridges from the 223 Remington to the magnums. This rifle will appeal to those who want a rifle which can be packed in a small space.



The Blaser R84 action open. The breech block assembly slides on two rails.

many of them. Therefore, my advice to owners of this rifle is if any part in the bolt and trigger mechanism needs to be repaired or replaced that the rifle be shipped back to the factory in Germany.

The receiver is made of aircraft aluminum. The exposed part of the receiver between the stock and forearm is approximately 4.12" long, and this area is very neatly engraved. The engraving is done on separate thin plates recessed into the receiver sides and probably are cemented in place. Because they are separate plates, I would judge that they are made of a stainless steel. It is made round at the bottom, and at both ends are tang-like projections which, when the action is stocked, are hidden. A through bolt in the buttstock fastens the stock to the receiver. At the front, a round aluminum rod fastened to the receiver becomes the forearm hanger. Most of the forearm channel is deeply routed out with the exception of an area at the front end of this rod. There the rod fits snugly into a hole, and a washer and screw threaded into this rod anchors the forearm to the receiver. The factory description states that the forearm is free-floated, and so it is, except that on my rifle as I received it a two inch area on the right side of the tip beveled heavily against the barrel. I corrected this by sanding this area down. But the buttstock and forearm cannot twist or shift.

The upper surface of the receiver is precisely machined its entire length. Much of it is flat. However, there are walls at both sides, walls which will contain, guide and hold the two guide rails of the bolt assembly. These guides extend the full length of the receiver.

The hammer-forged sporter eight barrel is securely threaded into a barrel extension. This part is made of steel and plays an

important part to this action. This heavily constructed part is about two inches long and is more or less octagon in shape; the front end for the barrel and the rear end is machined to except the bolt head with its three locking lugs. This part is drilled and tapped (three holes) for the one-piece scope mount base.

At the bottom, this monoblock is machined across its center to form a recoil lug and into which the takedown screw threads. Likewise, but in reverse, the top front of the receiver is made to precisely accept the bottom of the barrel extension, and with the takedown screw tightened, the barrel cannot shift forward or backward, and cannot twist or shift from side to side. It is a firm and solid joint.

The bolt assembly (I think it ought to be called the breech block assembly) has an aluminum shell which houses the bolt and firing mechanism, and to which is attached steel guide rails: one on each side and attached by four small screws. On the inside surface, these rails extend forward of the shell 4.5 inches with these extensions grooved on the inside. In addition to the other machine work done to the upper surface of the receiver, four projections have been left, two near the front end of the receiver and two at the rear. These projections are about an inch in length and each one has a ridge the same size as the grooves in the long guide rails, and they are placed so that they hold the rails close to the receiver walls. So well placed are they, that when the bolt assembly is in place, it slides open and closed so easily and smoothly without a hint of binding or noise. Besides, when the action is open with the bolt assembly backed away from the receiver, there is hardly a hint of end play. When the action is closed, the rails extend almost all the way into the forearm barrel channel.

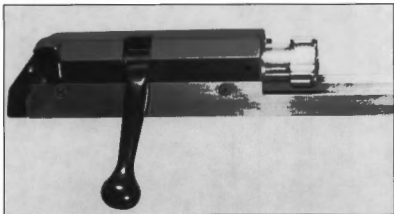
Held securely inside the bolt assembly shell is a square steel shell to which the locking bolt is fitted. This bolt has a round body which extends forward of this housing about .875", and it has three evenly spaced and solid locking lugs up front, which, when the action is closed and the bolt handle down, engage ahead of heavy support shoulder inside the barrel extension. The result is a very strong breeching, probably as strong as that of other turnbolt rifles.

The bolt is about 3.5 inches long, and the rear part of it is closely fitted into the steel housing where it is secured in some manner that it cannot move forward or back and still be rotated. To the rear end of the bolt body the bolt handle is attached by some means so that the bolt can be rotated and the bolt assembly locked and unlocked. A slot is cut through the aluminum housing to accept the bolt handle base and to allow it to rotate the 60 degrees needed to unlock and lock the bolt.

Somewhere inside the bolt is the firing pin (striker), coil mainspring, cocking cam notch and cocking piece. This last part extends down into a slot through the aluminum bolt housing far enough to engage the sear when the bolt is closed. A small projection on the rear of the cocking piece projecting through a hole in the rear of the bolt assembly housing serves as a cocking indicator.

The Blaser safety is substantial. It is fitted into the right rear of the bolt assembly housing where it engages with the cocking cam, with both machined so that on swinging the safety to the rear it draws the firing pin into the face of the bolt and locks it there. A night sound safety, I would say.

In a hole longitudinally in the left side of the bolt assembly housing, there is a spring tensioned plunger which is the bolt handle



This photo shows the Blaser breech block, the two rails on which it moves, and the bolt head with its three locking lugs, extractor, ejector and safety.

lock. When the action is closed, this plunger is pushed back into the bolt assembly shell and the bolt is unlocked, and it can be raised and lowered. Just as soon as the assembly moves back, this plunger extends forward to lock the handle so that it cannot be lowered. To quickly remove the bolt assembly from the action, it is necessary to lower the bolt when the action is open, and in this case the lock plunger can be pushed or depressed with a finger to allow the handle to be lowered.

The breech face of the barrel is flat as is the face of the bolt. However, the face of the bolt is recessed for the cartridge head, and when the action is closed and locked the cartridge head is ringed with steel. As in many other turnbolt actions described in this book, the ejector is a spring-backed plunger positioned in the edge of this recess. Also, as in the Savage M110C, Browning BBR and Winchester Post-64 M70, the extractor lies flush in a mortise in one of the locking lugs and like the others is spring tensioned. I am not especially fond of this type of extractor, but of the three other rifles mentioned, I believe the Blaser has the best one.

As mentioned earlier, I did not remove the trigger mechanism for reasons stated. However, I know fairly well its make-up. It is, I believe, in which the trigger parts are housed in an aluminum shell which is in turn an integral part of the trigger guard. The upper part of this trigger guard fits very closely into a recess in the bottom of the receiver. So close, in fact, that it might be difficult to remove it. Like the triggers in many of the modern rifles, it comprises of a sear, trigger, and the necessary pins, springs and screws. The sear is pivoted at the very top and has a projection up front that extends upward through a hole in the top of

the receiver high enough to engage with the cocking cam in the bolt. Below this sear is the trigger made so that its upper end will engage with a similar surface on the bottom of the sear. It functions like other triggers do, that is, when the action is closed and the trigger holds the sear up, the sear holds the cocking cam and firing pin cocked until released by pulling the trigger. This trigger can be adjusted for weight of pull. See the instructions later on.

The magazine is a heavy aluminum box that fits rather loosely in a recess in the aluminum receiver. With a barrel and bolt assembly removed from the stock, it will drop into place. It is a single-column magazine holding two cartridges, and with a cartridge in the chamber the rifle is a three-shot repeater. My rifle is chambered for the 22-250 and the magazine is made accordingly, and I do not know if magazines made for longer cartridges are different from my magazine. Anyway, my magazine has a grooved spring-tensioned follower and an unusual arrangement to hold the cartridges in the magazine and to guide them straight into the chamber. This arrangement consists of a two-lipped spring-tensioned gadget near the front of the magazine box which can move up and down independently from the follower. When a cartridge is pressed into the chamber, the shoulders of it spread out the lips to hold the cartridge in place. These lips hold and guide the cartridge into the chamber until the cartridge has moved forward beyond the lips. It is sort of clever.

Takedown

The Blaser is a takedown rifle with a very unique, simple and sensible design. It probably came about in that the designer wanted a rifle which will accept interchangeably other caliber barrels, magazines and bolt

assemblies in addition to the ones furnished with the rifle. For example, my Blaser rifle is a 22-250, and if I so choose I could order a different caliber of those suitable for this rifle and magazine, or even a bolt assembly. If I wanted a 7mm-08 caliber, I would order a barrel in that caliber and with it would come the correct magazine. Then, if I installed a scope on the barrel and sighted-in the rifle using it, I could switch from the 22-250 to the 7mm-08 at will and be quite certain that the zero would stay the same. Lastly, suppose I lost the sight of my right eye, I could order a left-handed bolt assembly and everything would fit properly to the one receiver.

The trouble with all of this is that few riflemen or hunters would use any of the above accessories. What so often happens is that if a shooter has a Blaser in one caliber of his or hers first choice, and then they do get another barrel for another caliber, they usually wind up with an extra barrel and magazine they seldom if ever use. If there has to be an extra bolt assembly besides to affect a change, and if they have considered the total cost of a change in calibers, they will surely wish they had purchased an entire new rifle instead. I have witnessed this often, and it usually ends up the extra barrels remaining in the gun cabinet never to be used. The whole idea of a takedown gun sounds mighty good especially to the younger shooters and hunters, but us old-timers and experienced riflemen know it just ain't so.

Anyway, the procedure to take the Blaser rifle down is quite simple. I find it best to remove the bolt assembly first, then the barrel and then the magazine. To remove the bolt assembly, merely open the action part way, then by depressing the bolt lock plunger on the left front end of the bolt, lower

Angled view of the Blaser receiver. Arrow points to the sear. This part also serves as the bolt-stop.



er the bolt handle, after which the assembly can be slid back off the receiver. Then with the proper Allen wrench, turn loose the take-down screw under the action until it is loose (it will not fall out) and lift the barrel from the action. After the barrel and bolt assembly are removed, tip the stock over and the magazine will drop out. Reassemble in reverse order. In the replacing of the bolt assembly, insert the ends of the rails low in the grooves in which they slide while holding the rear end of the assembly centered and low over the comb within $\frac{1}{16}$ " or so from touching. The assembly should then slide freely forward. Now, if the bolt handle has been raised, lower it so that the bolt assembly slides over the sear, after which raise the handle to full cock and the bolt will slide home.

Trigger Adjustment

There is only one adjustment available on the Blaser trigger and that is the adjustment for weight of pull. When I received my R84, I could not have asked for a better trigger and it needed no further adjustment. However, to make further adjustment proceed as follows: Take down the rifle as described above. In the bottom center of the magazine cavity there is a screw. This screw holds a cover plate down. Remove the screw and the cover plate to expose the weight of pull adjustment screw. Using a small screwdriver, turn this screw clockwise to increase weight of pull, counterclockwise to decrease it. You can determine if you have over-done the adjusting, or if you have improved it, by pressing down on the sear with your thumb and squeezing the

trigger. The sear is the small steel projection above the top of the rear end of the receiver. This part also serves as the bolt-stop. When you have finished, reassemble the gun and test the trigger. Do this by smartly closing the action several times, and if the striker falls even once you had better increase the weight of pull.

Comments

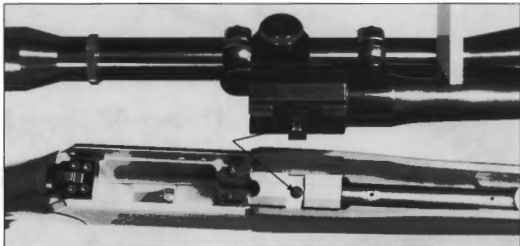
The literature that came with my Blaser R84 states that the rifle is furnished with a top scope mount attached, and that the mount is identified as a Blaser. My rifle came with a mount attached along with a pair of one inch rings. Perhaps the mounts once used on this rifle were Blaser mounts, but on my rifle the mount base and the rings looked to me all the world like Redfield products. Regardless, the one-piece base was securely attached by three screws to the barrel extension with one end projecting beyond the rear of it by about .750". Almost all of Redfield one-piece bases are made so that the opposing screw section goes to the rear, but on the mount base made for the Blaser this section is up front. This had to be to get the scope as low as possible, and I find nothing wrong with the base fitted on backward to the usual practice.

I must say here that not all scopes are suitable for this rifle. The problem can be that the reticle cell on a scope might not allow the scope to be mounted back far enough to obtain proper eye relief. The Ruger No. 1 also presents this problem. I put a Weaver scope on my rifle which provided the needed eye relief.

I found two minor faults with my R84.

One was that if the safety was engaged and then disengaged before the rifle was fired, something inside the firing mechanism prevents the bolt handle from readily being raised. Some minor change inside probably would eliminate this. The second one which I have already mentioned before in this chapter was that the tip of the forearm pressed against the right side of the barrel. This was easily corrected by sanding out this area of the forearm channel so that it no longer contacted the barrel.

It has not been customary with me in these chapters to test the rifles for accuracy, especially not the newer ones. However, because the Blaser rifle is so different from all the others, and a takedown one at that, I was curious about the accuracy potential of my particular rifle. Also, because I ordered my rifle chambered for the 22-250, which is a varmint caliber and my all-time favorite for many years, I had a skilled rifleman friend test it with his favorite handloads. Sighted with an 8x scope, and shooting at 100 yards, the first two shots from a dry and cold barrel struck less than .500" center-to-center. Adjusting the scope to hit on point of aim, five more shots were fired. They grouped about one minute-of-angle. However, if the first three shots of that group had been fired with the first two shots, all would have landed within less than .750 MOA. That, my friends, is excellent varmint shooting accuracy. More groups were fired with the barrel heated up from previous shots and they ran slightly above MOA. That is still good for most varmints. What has always been of highest priority to me in a varmint rifle, especially for crows, is that my rifle will



This photo shows the recoil lug on the bottom of the barrel extension and the recess for it in the top front of the receiver as shown by the arrows.

Blaser R84 Action

Dimensional Action Specifications

Receiver length	.....6.750"
Receiver width	.....1.58"
Breech block travel	.....4.50"
Firing pin travel	......230"
Bolt diameter	......688"

always place the first shot from a cold and unclean barrel exactly where I want it to go. If my rifle does that, then it is a rifle I can depend on.

Two weeks later we tested the rifle again. This time the first three shots from the cold and unclean barrel grouped less than .500", and the zero hadn't changed since the time before. That speaks very well for any varmint rifle.

General Specifications

Type	.....Bolt-action repeater, operated by bolt handle, sliding breech block.
Receiver	.....One-piece construction of aircraft aluminum alloy, trigger guard is a separate piece (see text).
Stock fastening	.....Buttstock and forearm fastening to receiver via through-bolts.
Bolt	.....Bolt has three forward locking lugs which engages in a barrel extension, cocks on uplift of bolt handle, bolt is mounted in a breech block.
Ignition	.....One-piece firing pin, coil mainspring, cocking indicator, mounted in the breech block.
Magazine	.....Non-attachable single-column magazine.
Trigger	.....Single-stage adjustable.
Safety	.....Pivotal type on the breech block locks firing pin and bolt handle.
Extractor	.....Claw type.
Ejector	.....Spring-backed plunger in breech block recess.
Bolt-stop	.....Sear doubles as bolt-stop.
Takedown	.....Barrel with extension containing the locking lug shoulders, fitted to receiver in a longue and groove mortise and anchored by a single screw. Turning this screw out allows barrel and extension to be removed.
Scope mounting	.....Barrel drilled and tapped for Redfield Jr. scope base.



Brno (Czech) Sporting Rifles

IF YOU HAVE a military rifle or action with **CESKOSLOVENSKA ZBROJOVKA, A.S. BRNO VZ-24** stamped on the side of the receiver, you own one of the very best Model 98 types ever made. If you have a rifle marked **ZBROJOVKA-BRNO** and **MODEL ZKK**, then you have one of the nicest sporting rifles made in Europe. Both were made in the city of Brno, Czechoslovakia; the VZs in great numbers from 1924 to 1945, and the ZKKs in more recent years. The VZs are very common as many of them were sold on the surplus market, but the ZKKs are quite rare in the U.S. The VZ action is the same as the standard M98 military action described in another chapter, but the ZKK is quite different.

History Of The Brno Firm

A brief history of the Brno firm is in order because not much is known about it. According to my information, about 1918 some military men took over the Austro-Hungarian armament shop in Brno, naming it the State Armament & Engineering Works. A year later the name was changed to Czechoslovak State Armament Works. Prior to 1924 this firm produced and assembled several thousand Mannlicher rifles and more than 40,000 M98 Mauser-type rifles.

In 1924 the firm name was again changed to *Ceskoslovenska Zbrojovka A.S.*, which translated means Czechoslovakian Arms Factory Ltd. However, it was then more commonly known as the CZ firm. The principal product manufactured was the M24 (or VZ-24) Mauser rifle for Czechoslovakia and several other countries. Various other basic M98 military rifles and carbines were also made there in large numbers for many countries the world over, including many which Germany used in WWII.

After WWII, the firm's name was again changed, this time to *Zbrojovka Brno* (Brno Arms Works) or *ZB* for short. This was again changed, at least for a short time anyway, to

Zbrojovka Brno-Jan (or Jane) Sverma (or *Svermy*) Works.

In the late 1930s, the firm began making a line of fine turnbolt sporting rifles based on the VZ-24 action. After WWII, they modified the action considerably and began making an even better sporting rifle called the Model ZG 47. They also made a short-actioned 22 Hornet bolt rifle, the Brno ZKM 465.

For a few years in the late 1940s and early 1950s, Brno rifles were imported into the U.S. I think these few Brno rifles reaching the U.S. in the 1960s, especially the Model ZKK, had been shipped in from a large sports shop, *Waffen-Frankonia*, of Germany. Others came into the U.S. through Canada. In the 1969 *Ellwood Epps* catalog, a "Brno 222 Rem." rifle was listed. No model designation was given. As of 1995, *Magnum Research, Inc.*, began serious importation of the ZKK 602 and others.

The Brno ZG 47

The "47" probably indicates the date this rifle was introduced. As most often pictured and seen, it is generally a typical German-type sporter with a very trim stock and slender barrel. While styles varied, the usual ZG 47 has a walnut stock of minimum dimensions, including a very thin comb, small cheekpiece, a small but well-curved pistol grip, and a slim, tapered forend ending with a schnabel. Narrow sling swivels screwed into the stock were standard, as were a horn pistol grip cap and buttplate. Grip and forend were checkered. The 23.6" round tapered barrel sported a bend ramp front sight with changeable sight blades and a windage-adjustable folding rear sight mounted on a small ramp made integral with the barrel. Later on they were made with a plain German-type stock without cheekpiece and grip cap or with the heavier American-type sporter stocks, the latter having a very pronounced Monte Carlo comb and a full forend.

The ZG 47 action was like the basic M98

type, but with these "improvements:" 1) Receiver ring and bridge have integral scope mounting bases or dovetails, flat on top, with the top of the bridge lower than the ring. The dovetail covered the entire length of the bridge, but the receiver dovetail ended just short of the front edge of the receiver. The Brno-made ZG 47 scope mount was called a "slide-on" type bridge mount with thumbscrew-tightened clamps. An anchor block, provided on the left rear of the base, engaged a matching notch cut into the side of the receiver bridge, preventing the scope and mount from moving forward under recoil. 2) The streamlined bolt sleeve had a rotary-type safety built into its right side. Pivoted upward, the safety locked both striker and bolt, its low position allowing operation with a low-mounted scope. 3) The pear-shaped bolt handle, dropping straight down, is also made so that it can be operated under the low-mounted scope. 4) The all-steel magazine has a hinged floorplate, its latch in the front of the trigger guard bow. 5) Two trigger mechanisms were available: a standard double-set or a single-stage type with a built-in single-set trigger.

ZG 47 rifles were available in 270, 7x57mm, 7x64, 30-06, 8x57mm, 8x64S, 9.3x62 and 10.75x68. These well-made rifles are usually highly prized by their owners. They were listed in the 1964 *Waffen-Frankonia* catalog, the best grade at \$139.50.

The Brno ZKK

I don't know exactly when the Model ZKK Brno rifle was first offered, but probably after 1965. I first read about it in the 1969 issue of the *Gun Digest*.

Illustrated here are three different views of

(Above) Czech Brno ZKK 601 rifle chambered for the 222 Remington cartridge. Obsolete Kesseling mount rings are used here to attach the scope to this rifle.

the ZKK 601: The ZKK-600 has the standard-length action for cartridges of the 8x57mm to 30-06 length. The ZKK-601, a shorter action, is used for such cartridges as 222, 243 and 308. The ZKK-602, a long or "magnum" action, handles such large cartridges as the 375 H&H Magnum and 404 Jeffery.

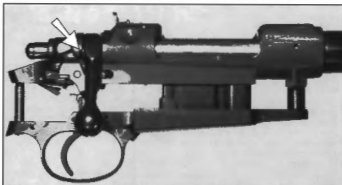
Except for action length and calibers, ZKK-600 and ZKK-601 rifles are alike—typical German-type sporting rifles, quite light and trim. The walnut stock without the very thin comb or the schnabel is otherwise typically European, with a small, uncapped pistol grip, and a very slender, short forend. The moulded plastic buttplate does not have rounded edges and looks out of place. The checkered panels on the grip and forend cover a goodly area, but the checkering was not well done, at least not on the rifle I examined. A plain 1" sliding swivel is screwed into the buttstock; the front swivel is mounted on a barrel band, several inches forward of the forend tip. The comb is quite low, about 1/2" below the bolt when it is opened, and low enough so that the open sight can be readily used. The 23.6" slim, round-tapered barrel carries a band-ramp front sight, made so that the blade sight can be easily replaced. The folding leaf rear sight, dovetailed into an integral ramp on the barrel, is adjustable for windage only by driving it over. Flipped up, it presents a small-U sighting notch, and when lowered, it is out of the way when the rear aperture sight is used.

The rear aperture sight is built into the top flat of the receiver bridge, that is, within the integral scope mount base. Pressed down, it lies entirely within the receiver bridge, thus is out of the way if the regular open sights or a scope are used. Depressing a plunger on the right side of the bridge pops the aperture up into view. A screw in the front of the aperture arm adjusts elevation, while another screw in the aperture arm adjusts windage.

The 601 rifle weighs about 6.75 pounds, the ZKK-600 about 7.

The ZKK-602 rifle, made for the 375 and 458 Magnums, is heavier, going around 9 pounds. Besides having a longer action with a deeper magazine, it is also beefed up in other areas. The stock of the 602 nicely accommodates the dropped magazine. It is of English style, with a short, slim forend, no cheekpiece, no grip cap or forend tip, decent checkering, and a thick black treatise-type recoil pad with no white-line spacer. It is stocked in a classic pattern for offhand shooting with the excellent express sights, there being a bit more drop to the stock than is usual for a rifle designed for use with a scope. The magnum-length 602s in either 375 H&H or 458 Winchester calibers are handy, well balanced rifles clearly designed for iron-sight use against dangerous game.

The 602 rear sight is an express-type, with a fairly wide vee notch, marked for 100 yards. There are two folding leaves for 200 and 300



Brno ZKK 601 action. The ZKK 600 and 602 actions are similar to this one, but have longer magazine boxes. The action is shown with the peep sight up in sighting position, action cocked, and the safety in the OFF (tipped back) or FIRE position. When the safety is tipped forward, it locks the sear and the bolt, the latter being accomplished by the top of the safety engaging over the bolt lock lug (indicated by arrow) on the base of the bolt handle.

yards, and these snap up and down very positively to stay where they are put, in spite of heavy recoil. The front sight is an easily-replaced bead, covered by a hood with a cutout to admit light onto the rear face of the bead. The 602s have a second recoil lug formed at the rear end of the lug under the rear sight, integral with the barrel, that bears against a steel block inletted into the forend. The barrels, at least on the 602s, are hammer forged and lapped, and are very smooth inside and very accurate. The contours of the action bottom are different also, more on that later. Except for these points and having a barrel proportionally larger, the 602 is just like the 600 and 601 models. It is not furnished with the extra single-set trigger, and it does not have the aperture rear sight.

The ZKK Brno Action

The ZKK action cannot be described as

merely "an improved M98 Mauser" action, for it is much more than that. The action is of all-steel construction.

The one-piece receiver is a forging, very nicely machined on every surface. The 602 is probably the only forged magnum-length Mauser action made anywhere in the world today, something that ought to make custom rifle-builders sit up and take notice. Inside the receiver ring, the M98 collar is slotted only on the right for the extractor, a good feature that adds strength. The recoil lug, made as an integral part of the receiver ring, has ample bearing surface with the stock to prevent set-back. Except for the 602, there is no flat surface under the receiver ring, which is regrettable since a flat surface here might add years to the life of the stock by preventing possible splitting.

The magnum-length 602, on the other hand, has a flat surface between the very thick recoil lug and the front of the magazine cutout. There



Left side of the Brno ZKK 601 action.

PART II: Commercial Rifles & Actions

are also transverse serrations milled into the bottom surface of the action in two areas: near the front of the magazine opening, and under the rear tang. These serrations bite into the wood and into the rear spacer bushing, and prevent the metal from sliding along the wood in recoil, which seems to help greatly to prevent splitting. These stocks have no cross-bolts whatsoever, though due to the simple trigger design, there is rather a lot of wood thickness remaining in front of the trigger, where hard-locking rifles generally start to split their stocks.

The receiver ring is about 1.65" long. The bridge, about 1.50" long, is built up so its top is level with the raised top of the ring. The ring and bridge tops are flat, becoming integral scope mount bases after grooves are milled in their sides. As mentioned earlier, an excellent and fully adjustable pop-up rear aperture sight is built into the base on the bridge. A deep notch is cut into the left side of the bridge for the anchor block of the Bmo scope mount rings.

The high left receiver wall between the ring and bridge is unnotched, though its top half is made thinner to reduce weight. The ejection port opening on the right extends to the bottom of the locking lug raceway. Both walls are greatly strengthened and stiffened by a heavy-walled magazine-box guide or retainer, similar to, but heavier than, the M70 Winchester and M77 Ruger actions. The sides of this box are quite thick, and with the right wall extending back to the safety, they offer a considerable flat surface area for bedding.

Integral cartridge guide lips on either side of the magazine-well opening hold the cartridges in the magazine and guide them into the chamber when the bolt is closed. The loading ramp in front of the magazine-well opening is deep and polished smooth.

The magazine box is made of heavy steel



Close-up of the Bmo ZKK 601 rifle action; scope attached with Kesseling mounts.

metal—pressed, bent and formed into a rigid box. I assume that at least four different sized boxes are made to handle the four families of cartridges for which these rifles are chambered. This would include the short magazine for the 222 cartridge (it is 2.250" long inside), one for the 243 and 308 (about 2.875" long), one for the 30-06 family, and the longest one for the 375 H&H Magnum and 404 Jeffery cartridges. In the 30-06 and shorter magazines, grooves are pressed into the sides of the box at the cartridge shoulder junction to hold the cartridges back in the box to prevent battered bullet points as the rifle recoils from firing.

The receiver accepts only the magazine box for the cartridge family for which the action is made, and the cartridge guide lips in the magazine well are made accordingly.

The usual W-shaped follower spring is used with a steel follower, the latter machined on all surfaces and polished very smooth. The unusual thing about it is that the ridge which staggers the cartridges in the magazine is on

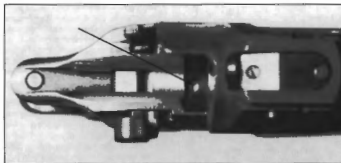
the right side rather than on the left, as are the followers in most other actions. However, the 602 has it on the left.

The trigger guard is combined with the magazine plate, and the magazine box is held between this part and the receiver when the rifle is assembled. The floorplate is hinged to the front of the guard plate. A very neat and heavy plunger-type catch in the front top part of the guard bow holds the milled floorplate closed. The floorplate, particularly on the drop-box 602, is very beautifully machined throughout, obviously not an investment casting.

Guard screws, going through the ends of the trigger guard plate and threading into the recoil lug and receiver tang, hold the action securely in the stock. Sleeves or bushings are used over each of these screws to provide the proper spacing between the trigger guard plate and receiver. The ends of the follower spring slip into slots in the floorplate and follower to hold these parts together. Incidentally, the guard screw threads are about .230" in diameter, their pitch being



Bmo ZKK action, open.



Top view of the rear part of the Brno ZKK action, with bolt removed, showing the location of the trigger adjustment screw within the safety locking lug recess, as indicated by the arrow.

about thirty-three threads per inch.

The bolt is a one-piece forging, the bolt handle an integral part. The dual opposed locking lugs on the front of the bolt are solid; that is, neither one is slotted or drilled. The bolt face is slightly recessed for the cartridge rim, with this recess undercut at the bottom as on the M98 bolt to allow cartridges to slip under the extractor hook when being fed from the magazine. (This feature largely eliminates the possibility of double loading. I consider this a desirable feature in a hunting rifle—more desirable than a fully recessed bolt head.) The approaches to the locking-lug shoulders inside the receiver ring are beveled and, on rotating the bolt to lock it, the bolt is cammed fully forward.

The low-profile bolt handle will clear a low-mounted scope. Its stem, round and slightly tapered, ends in a pear-shaped grasping ball. The ball has a hole drilled in it, to considerable depth. The bolt handle is on the very rear end of the bolt, and its base partially encircles the bolt. The under part of this base serves

as the third safety locking lug by engaging a matching recess milled into the receiver. The upper part of the base has an angled surface which contacts a matching surface in the bridge when the bolt handle is raised, and this provides the initial extraction power.

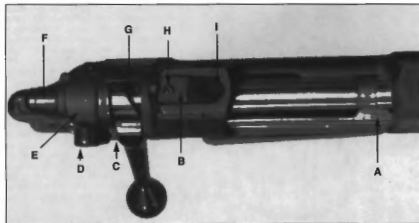
The extractor is of the long one-piece non-rotating Mauser type attached to the bolt body by a collar. A lip under the front end of the extractor, engaging a groove cut part way around the bolt head, prevents longitudinal extractor movement. The extractor has enough spring, and room enough to spring, to slip over the rim of a cartridge placed in the chamber ahead of the extractor.

The ejector is a thin piece of steel lying in a slot cut into the bottom of the receiver bridge. It pivots on a pin, tensioned by a small coil spring and plunger. An angled slot is cut into the bolt head, and on opening the bolt, the tip of the ejector moves into this slot to eject the cartridge case or cartridge to the right.

The bolt-stop is a heavy piece of sheet steel

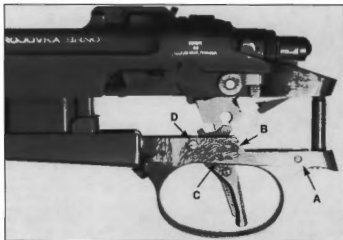
fitted into a slot cut into the bottom left side of the bridge and opening into the left locking lug guideway. Pivoted on the safety pin, it is tensioned by a small but stiff coil spring. The bolt is stopped in its rearward travel when the left locking lug contacts the bolt-stop. The rear end of the bolt-stop projects out of the receiver just behind the bridge, and by pressing this part forward the bolt-stop is tipped down to allow removal of the bolt. The ejector and bolt-stop are close copies of the same parts in the old Model 70 action, and there is nothing wrong with these systems.

The firing mechanism is composed of the bolt sleeve, one-piece firing pin, coil mainspring, cocking piece, mainspring retainer nut, mainspring retainer nut lock and bolt-sleeve disassembly catch and spring. The bolt sleeve, threaded into the rear of the bolt, is bored through for the cocking piece. The cocking piece is semi-permanently attached to the firing pin with a cross pin. The stiff coil mainspring is compressed between the stem of the bolt sleeve and the mainspring retainer nut lock and retainer nut, with this part being threaded on the firing pin. This threaded portion is flattened, and the inside of the lock is made to fit over it so it will not turn. The front of this lock has two small humps which engage in shallow notches in the retainer nut, and with mainspring pressure against the lock, the retainer nut is prevented from turning. A small disassembly catch is built into the left side of the bolt sleeve, its purpose being to hold the cocking piece back so the firing mechanism can be easily unscrewed from the bolt. Before the bolt is removed from the rifle, this catch can be engaged to hold the cocking piece back by pressing it in while opening the bolt handle (see takedown instructions). A cam on the cocking piece engages in a cam notch in the rear of the bolt, and on raising the bolt handle, the striker is cocked. There is no separate bolt-sleeve lock, the bolt sleeve being



Top view of the Brno ZKK action showing: (A) Mauser type extractor, (B) rear aperture sight built into the receiver bridge, (C) bolt lock lug, (D) safety, (E) bolt sleeve, (F) cocking piece, (G) primary-extraction cam surface, (H) windage lock screw, and (I) elevation adjustment screw.

PART II: Commercial Rifles & Actions



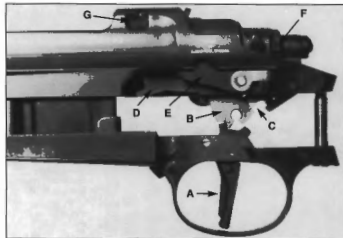
The accessory single-set trigger which is furnished as an extra with the ZKK 600 and 601 rifles. It is shown here in the "un-set" position, and the rifle can be fired in the normal way by merely pulling the trigger back. (A) pin which holds the two set trigger springs in place in the trigger guard, (B) trigger spring stop pin, (C) trigger pivot pin, and (D) set trigger sear pin.

prevented from turning when the bolt is open by the cocking-piece cam resting in a shallow notch on the rear of the bolt. There is also a small ball bearing in front of the bolt-sleeve disassembly catch-spring which projects through a hole inside the bolt sleeve; when the bolt sleeve is fully in place, and when the bolt handle is raised,

this ball engages another small notch in the rear of the bolt, helping to keep the bolt sleeve from turning. The entire firing mechanism is simple and well-designed; lock time is fast and positive. The method of holding the mainspring on the firing pin via a threaded nut is good.

A feature I have not found on any other

To fire the ZKK rifle with the single-set trigger, it is pushed forward with the tip of the thumb until "set" or cocked, in which position it is shown here. A light touch on the set release lever (A) releases the main set trigger to snap back under tension of the set trigger mainspring to disengage the regular sear release (B) from the sear (C). Also clearly shown in this photograph is the ejector (D), bolt-stop (E), bolt disassembly catch (F), and anchor recess for the Bmo scope mount (G).

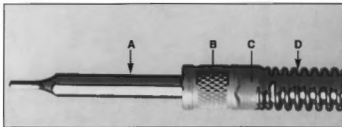


turnbolt action is the way the cocking piece on the action fits into and slides in a mortise in the tang. A ridge on each side of the cocking-cam arm fits into recessed grooves in the cocking cam raceway. This prevents binding of the cocking piece in the bolt sleeve due to upward pressure from the sear when the action is cocked, as well as limiting up and down play of the cocking piece and bolt.

The standard trigger mechanism, of the single-stage type, is adjustable for weight of pull only. The entire mechanism is comprised of numerous parts, and most of them are attached to the receiver. The sear, the part which projects into the cocking-piece cam guideway to hold the striker back, is positioned under the receiver tang; there it pivots on, and is held in place by, a cross pin through the receiver walls. It is held upward by a coil spring secured in place under the sear by a small arm, which is also held by the sear pin. Forward of the sear is the sear release, which is held in place by, and pivots on, the safety pin. It is tensioned to engage the sear by a coil spring, with the top end of this spring bearing on a small strip of metal; this, in turn, bears against the notched bottom of the trigger weight-of-pull adjustment screw threaded into the bottom of the receiver. On removing the bolt from the receiver, the head of this screw is exposed in the safety lug notch; turning it in (clockwise) increases the weight of pull, and vice versa. A shallow notch on the rear of the sear release engages a sharp corner on the front bottom of the sear to hold the sear up, and the striker back, when the action is closed.

The trigger, which has a well-curved and grooved finger piece, is pivoted on a pin in the trigger guard. A top arm on the trigger extends into a U-notch in the bottom of the sear release, and on pulling the trigger back, the sear release is tipped down to release the sear against the pressure of the mainspring. There is a very slight amount of slack in the trigger, but this is not at all bothersome. Otherwise, the trigger pull is short and crisp, and the normal weight of pull can be adjusted from about 2.5 to 4 pounds. This trigger system is standard on all three models of the Bmo ZKK. However, an extra single-set trigger accessory unit is furnished with the 600 and 601, and the trigger guards of these two models are set up to accept this unit.

This accessory unit is comprised of a main trigger with a straight finger piece, set trigger lever, release-lever adjustment screw, release-lever spring, release-lever pin, trigger mainspring, trigger tension spring, two hold-down pins, and the release-lever engagement pin, with this last part already fitted in the trigger guard. The set trigger is quite easy to install and it is done as follows: Remove the trigger guard from the stock. Push out the trigger pin, remove the trigger, and replace it with the assembled set trigger. Before inserting the trigger pin, slip the thin spring into the heavy



Brno firing pin showing: (A) firing pin, (B) mainspring retainer nut, (C) retainer-nut lock sleeve, (D) mainspring.

spring, and with the short ends of the springs down, insert the long ends of the springs into the square notch in the rear of the trigger; then depress the bent part of the springs into the trigger guard and insert a pin through the hole provided to hold the springs in place. Now manipulate the trigger by pushing the finger piece forward until the pin can be inserted in the hole over the end of the heavy spring. Then push the trigger down so the trigger pin can be inserted. Turn the adjustment screw in or out as required so that as the trigger is pushed fully forward, the release lever engages with the release-lever pin in the trigger guard to hold the trigger forward. The screw can then be adjusted so that only a light pull of the release lever will allow the trigger to snap back. Replace the trigger guard in the stock.

The set trigger can also be operated as a conventional trigger by merely pulling it back, as with the regular trigger. To use as a set trigger, push the trigger ahead with the tip of the thumb until it is cocked and stays forward under spring pressure, then fire the rifle by a light touch on the set trigger release lever.

If the rifle is not to be fired after the trigger has been set, it can be unset again by placing the thumb firmly behind the trigger and releasing the trigger by the forefinger of the same hand. Never set the trigger until just before you are to take a shot, and promptly unset it if the shot is not taken.

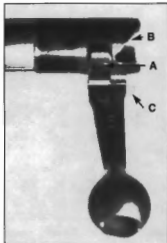
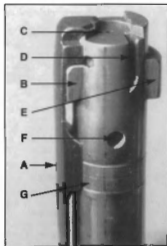
The safety, rugged and positive, is positioned on the right side of the receiver tang directly behind the bolt handle and is held in place by, and pivots on, a pin. It is provided Off and On tension by a spring and plunger occupying a slot cut into the side of the receiver, just ahead of the safety. The safety thumbpiece, large and knurled, is convenient in operation. Pulled back, the safety is in the Off or Fire position, at which time a red dot is visible in the base of the bolt handle. The bolt can only be operated when the safety is back. When pushed forward, the bolt and sear are locked by the top of the safety engaging over a projection on the base of the bolt handle. The bottom of the safety engages over the bottom of the sear and pulls it up slightly. While the safety is convenient to operate and

positive, it is not easily operated and makes a distinct click when pulled back, due mostly to the very stiff safety plunger spring. Late model 602s have a rubber insert that acts as a stop for the safety and prevents most of the noise.

The action is adequately vented in the event of a primer or case head failure. A hole in the right side of the receiver ring coincides with a top corner of the extractor hook. There is a single round vent hole in the bolt body about one inch back of the bolt head, and gases getting inside the bolt would be vented into the left locking lug raceway. There is no flange on the left side of the bolt sleeve to deflect any gases that might escape back through this raceway, so it is no better sealed at this point than the M70 Winchester.

Besides the two guard screws, there is also

Brno ZKK bolt head showing: (A) extractor, (B) right locking lug, (C) undercut bolt-face recess, (D) ejector slot, (E) left locking lug, (F) gas-vent hole, (G) extractor collar.

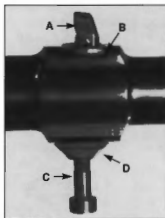


Bottom view of the rear end of the Brno ZKK bolt showing: (A) safety lug, (B) cocking-cam notch, (C) bolt-locking lug.

a forend screw to help hold the barrel and action in the stock. This screw threads into a stud fitted in a groove in the enlarged portion of the barrel which forms the rear sight base. The 602 has an additional recoil lug machined into this enlarged portion of the barrel. The groove for the forend stud is milled lengthwise with the barrel, and the stud is made to be a loose fit in it. Thus, on tightening this screw, the stud moves to the precise location of the screw. It might also move in the groove as the barrel heats up from firing or if the forend should shift through changes in moisture and temperature. While I think it is a good idea to have a forend screw in magnum calibers, I don't see much use for it in the other rifles; but if a screw is used, I think the method Brno employs in the ZKK is the best I have seen.

Metal Finish

The Brno ZKK receiver has an unusual finish. It seems to have been heavily sand-blasted. The surface has a matte finish that is grayish in color, contrasting with the well-polished blued barrel and the bright bolt and extractor; the effect is quite pleasing. The bolt sleeve, cocking piece, safety, trigger and the bolt-stop are finished just like the receiver. The bolt handle is highly polished and blued, as are the trigger guard and floorplate. These parts are smooth, level and well polished. The action was smooth, easy to operate, and everything functioned perfectly. The boltway inside the receiver was well polished, making for smooth bolt operation. No bolt guide rib is provided, but the bridge is long



Shown here is the Brno ZKK folding rear sight (A) dovetailed into ramp base (B) made integral with the barrel. Below is forward screw (C) threaded into a movable stud (D). See text for details.

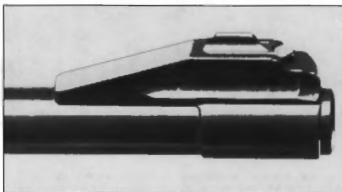
enough to guide the bolt properly; there is little tendency for the bolt to bind when it is operated.

Comments

There are a few things I don't like about this rifle and a lot of things I do. For my taste, the stock is a bit too skimpy, but what I disliked most was the cheap square-edged plastic buttplate. If I had anything to do with the design of this rifle I would have made an extra gas-vent hole in the left side of the receiver just behind the inside receiver collar and place the vent hole in the bolt so it would direct gases into the magazine instead of into the left locking lug raceway. Other than these points, the Brno rifle and action are very much to my liking.

I like the balance and feel of this rifle. On a hunting rifle, I like to have the front sling swivel out on the barrel as on this rifle. Unfortunately, the latest 602s have the front sling swivel on the stock, where it can bash the finger on recoil. I don't think any other commercial rifle, made now or ever before, has a better open sight setup than found on this Brno rifle. The rear aperture sight deserves special mention. It not only is a very clever sight, but it is well designed and constructed. It is handy and does not interfere with anything. When not in use it is well protected from damage, and when needed it's instantly ready. It is a little package of insurance to a hunter. The shooters to whom I've shown this rifle have all called this sight a gem. Sadly, it's not on the newest 602 actions.

I don't believe there is another turnbolt action made that has a better, stronger or more positive bolt lock. Few other actions I know of have a better, simpler, or more rugged and reliable trigger and ignition system than this Brno action. I



Brno ZKK band-ramp sight with removable sight blade. Depressing the checkered round plunger at the front of the ramp allows the sight to be slid out.

don't think too much of the single-set trigger as Brno has made it, but I find no fault with the standard trigger. I like the long Mauser-type extractor.

Brno ZKK Markings

The Brno trademark is the letter Z within several concentric circles (meant to represent a view of the interior of a rifled barrel). This emblem, with the words TRADE MARK in small capitals, is stamped on the top flap of the receiver ring and on the barrel. On the left side of the receiver is stamped:

—ZBROJOVKA BRNO—

In smaller letters on the side of the bridge in three lines is:

MADE
IN
CZECHOSLOVAKIA

The word BRNO and the model designation are stamped on the receiver bridge thus:

MOD.

ZKK-600 (or 601 or 602)

The serial number is stamped on the right side of the receiver ring with its last four digits stamped underneath the bolt handle. Stamped on top of the barrel are the words:

ZBROJOVKA BRNO—
CZECHOSLOVAKIA

The caliber is stamped on the breech of the barrel at the top and also on the follower, visible when the action is opened. Current Czechoslovakian proofmarks (including the date, as 66) are stamped on the barrel breech, receiver ring and bolt.

Takedown and Assembly

First make sure the chamber and magazine are empty. To remove the bolt, raise the handle and, while pressing the bolt-stop knob fully forward, pull the bolt from the receiver. It can be reinserted without pressing the knob. The safety must be pulled back to remove or

replace the bolt.

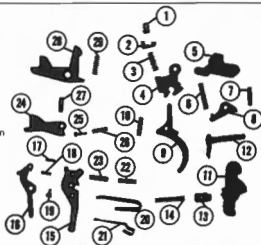
Bolt disassembly: With the bolt in the rifle, turn the handle down, cocking the firing mechanism. Press in the disassembly catch and lift the bolt handle and withdraw the bolt. The cocking piece and firing pin assembly may now be easily unscrewed. If the firing mechanism is to be further disassembled, it will be first necessary to disengage this catch. Do this by placing the firing pin tip on a hard smooth surface and depress the bolt sleeve until the catch is freed. A simple tool must be made to disassemble the firing mechanism, though more recent rifles come with this accessory. Saw or file a notch about $\frac{3}{16}$ " wide and $\frac{1}{4}$ " deep in a piece of heavy sheet metal and place it in a vise with the notch up. Insert the firing pin into this notch at about the second coil back from the front of the mainspring and, while pushing forward on the firing pin to compress the mainspring slightly, unscrew the firing-pin nut from the firing pin; after this, the lock ring, mainspring and firing pin can be removed from the bolt sleeve. The cocking-piece catch can then be removed from the bolt sleeve by using a small drift punch and pushing the catch to the inside through a small hole over the catch. Be careful not to lose the very small plunger, spring and ball bearing that are under the catch. To reassemble, insert the ball bearing, spring and plunger in the hole in the bolt sleeve, depress the plunger with a small punch, and then, holding the catch with tweezers, slip it in place. The notched tool you made to disassemble the firing pin parts must also be used to assemble the parts. In assembling the firing pin parts, the firing-pin nut must be turned on as far as it will go, but need not be forced tight. Before assembling the firing mechanism into the bolt, the cocking piece must be pulled back so the cocking piece catch can be engaged.

To remove the extractor, lift the lock away from the bolt and push the extractor forward. The extractor collar can be spread apart and removed,

Parts Legend

- 1 Trigger adjustment screw
- 2 Adjustment-screw click plate
- 3 Sear-release spring
- 4 Sear release
- 5 Sear
- 6 Sear spring
- 7 Sear pin
- 8 Sear-spring arm
- 9 Trigger
- 10 Trigger pin
- 11 Safety
- 12 Safety pin
- 13 Safety plunger
- 14 Safety-plunger spring

- 15 Single set trigger
- 16 Set-trigger release lever
- 17 Release-lever pin
- 18 Release-lever spring
- 19 Set-trigger adjustment screw
- 20 Set-trigger mainspring
- 21 Set-trigger spring
- 22 Set-trigger spring hold-down pin
- 23 Set-trigger spring stop pin
- 24 Ejector
- 25 Ejector plunger
- 26 Ejector spring
- 27 Ejector pin
- 28 Bolt-stop
- 29 Bolt-stop spring



Brno ZKK Trigger System

Dimensional Action Specifications

Weight (estimated):	
Model 601	41 ozs.
Model 600	43 ozs.
Model 602	45 ozs.
Length:	
Model 601	8.00"
Model 600	8.625"
Model 602	9.125"
Receiver ring width	1.420"
Bolt dia.	.700"
Bolt travel:	
Model 601	4.225"
Model 600	4.625"
Model 602	5.188"
Striker travel	.375"

General Specifications

Type	Tumbolt repeater.
Receiver	One-piece steel. Integral scope mount bases on the bridge and ring. Pop-up aperture sight built into the bridge.
Bolt	One-piece machined steel with dual-optional forward locking lugs. Safety lug on the rear of the bolt.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable box magazine with hinged floorplate.
Trigger	Single-stage, adjustable for weight of pull. Single-set trigger is furnished as an extra.
Safety	Pivoting side tang type locks sear and bolt when tipped forward.
Extractor	Long one-piece non-rotating Moser type attached to the bolt by a collar.
Bolt-stop	Pivoting type positioned in a groove in the bottom of the receiver, stops bolt by contacting the left locking lug.
Ejector	Pivoting type positioned in a groove in receiver bottom.

but this may spring the collar so that it may not be perfectly round when refitted to the bolt.

To remove the stock, turn out the forend screw, as well as the front and rear guard screws; now the barrel and the action can be lifted from the stock and the trigger guard pulled from the bottom of the stock. The magazine box can then be pulled from the receiver and the pins pushed out of the trigger guard to remove the trigger, floorplate and floorplate catch.

Disassemble the safety and sear mechanism as follows: Push out the sear pin and remove the sear, sear spring and sear-spring arm. Push out the safety pin from right to left. Lift out the sear release, sear-release spring and trigger-adjustment click plate. Lift out the bolt-stop and bolt-stop spring. With a small punch, pull the safety plunger forward and lift out the safety, after which the safety plunger and spring can be removed. With a bent

punch, push out the ejector pin to the left and lift out the ejector from the hole behind it. Turn out the trigger adjustment screw. Reassemble all of these parts in reverse order.

The barrel is screwed tightly into the receiver and should not be removed unless necessary, and then only if proper equipment to do so is at hand.

So far I have described only one Brno rifle, and I am aware that a number of variations exist. Pete Dickey, formerly with Firearms International, Inc., and for a number of years on the technical staff of *The American Rifleman*, describes the Model ZKK 600 rifle that he acquired, a rifle which differs from the one I described here. His rifle, in 270-caliber, has the words SAFE and FIRE stamped on the bolt sleeve, and an American-styled stock with recoil pad, pistol grip cap and forend tip made of some dark wood, all with white spacers. With the rifle was a special tool with screwdriver blade that can be used to adjust the trigger and the sights,

and for disassembling the firing mechanism.

For a long time, only a few Brno rifles had been imported to Canada and the U.S. For a long time, acquiring this rifle in the U.S. has been a problem. In the 1996 *Gun Digest*, four main Brno rifles are listed: 1) Brno ZKB 527 Fox rifle—a short-actioned rifle with a detachable box magazine in calibers 22 Hornet, 222 Rem. and 223 Rem. 2) Brno CZ 537 Sporter rifle—in calibers 270, 30-06 (internal five-shot magazine), 243 and 308 (detachable five-shot magazine). 3) Brno CZ 550 rifle—in calibers 243, 308 (four-shot detachable magazine), 7x57 270, 30-06, 7mm Rem. Mag. and 300 Win. Mag. (five-shot internal magazine). 4) Brno ZKK 600, 601, 602 rifles—in calibers 7x57, 30-06, 270 (M600); 243, 308 (M601); 375 H&H, 458 Win. Mag. (M602) and five-shot magazine. To find the name and address of the importer you need only consult the latest issue of the *Gun Digest*.



Browning A-Bolt II BOSS Rifle

THE TITLE OF this chapter will require some explanation. In another chapter, I describe the Browning BBR, a model introduced around 1984. In this chapter, I will try to describe a modification of this action which Browning calls the A-Bolt, introduced in the early 1990s. It is the Model A-Bolt II, which has a somewhat different bolt than used in previous models. There are three grades of the Browning A-Bolt, namely Hunter, Stainless Stalker and Medallion. The Hunter grade is the lowest in cost. Now comes the BOSS in the title. "B-O-S-S"—these four letters stand for Ballistic Optimizing Shooting System. WOW! These four words refer to a very distinct and visual feature of this model, the device on the muzzle of the barrel. You will have to read further on for Browning's and my description of this device.

The rifle shown here is the A-Bolt II Hunter, the one I purchased in 1994 and will describe. It is chambered for the 25-06 cartridge, a very excellent powerful, flat shooting number ideal for long-range work on the larger varmints and for antelope. It has a plain walnut stock with no cheekpiece and with a non-reflective, rust-resistant, black matte surface on the barrel and receiver. Without scope, it weighs around 7 pounds. It is fitted with Browning's novel detachable magazine which is a feature many hunters will like.

For this Hunter model, Browning used a plain piece of dense walnut, shaping it just right for comfortable shooting. It is fitted with a smooth-sided recoil pad and sling swivel studs for standard sling swivels. After being well sanded smooth and level, it was given a glossy hard surface finish of some kind, and both the pistol grip and forearm cleanly checkered. I like the pistol grip on it. It is not capped, and its end is blended

smoothly with the bottom line of the stock. I also like the height of the comb and the thickness of it, making it ideal for scope sighting. The receiver is bedded into a scant amount of bedding compound, and from the receiver forward the barrel is entirely free-floated as this is a part of the BOSS system. There is no bedding compound in the tang area. However, there is a steel shim between tang and wood, the reason for that I can only guess at.

Now comes the real BOSS system, which is the muzzlebrake on the muzzle of the 22" round tapered barrel. I am going to call this feature a device rather than a brake because Browning credits it for doing much more than to reduce recoil. Anyway, this device accompanied by a checkered lock nut is threaded on the barrel with threads cut to minimum tolerances so that both parts can be just turned by hand. In addition, a nylon strip in the threads of the body also make up for some tightness. The barrel, lock nut and the brake part are calibrated, the purpose of which will become clear in the following description of the function of this device taken in part directly from the Browning booklet that comes with the rifle.

General Operation

The BOSS (Ballistic Optimizing Shooting System) operates as an adjustable rifle barrel vibration dampener and muzzlebrake. An adjustable weight affects accuracy while a series of exhaust holes reduce recoil.

Every time a rifle is fired, barrel vibrations are set in motion. These vibrations occur in all directions, even back and forth along the axis of the barrel. Browning research has confirmed that barrel vibrations are the primary cause of inaccuracy. Barrel vibrations are influenced by many

factors such as bullet type, bullet weight, primers, different powders and barrel configurations.

The BOSS adjusts the timing of barrel vibrations so the bullet consistently leaves the rifle muzzle at the most advantageous time. Once the BOSS is adjusted to this "sweet spot" for a given ammunition, your rifle will consistently deliver extraordinarily tight groups. With precision ammunition, BOSS-equipped rifles of many calibers are capable of 100-yard, one-hole groups. The smallest three-shot group obtained during the BOSS development measured an incredible .067", using factory loaded hunting ammunition. With the BOSS you can tune your rifle to get the optimum accuracy for all available factory loads.

When adjusted to the "sweet spot," the BOSS will compensate for slight deviations in ammunition velocity. The BOSS will not, however, compensate for poor shooting or flyers caused by low quality bullets and ammunition.

The unique exhaust hole pattern on the BOSS provides considerable recoil reduction.

The BOSS body length is two inches for all calibers. The size of the gas vent holes and hole pattern is the same for all calibers. The size of the bullet exit hole is the same for all calibers except for the 338 Win. Mag. The thread system for the 338 Win. Mag. is different from other calibers to rule out the possibility of accidentally switching components and creating an unsafe combination.

Each BOSS consists of a locknut, body and weight.

(Above) Browning Model A-Bolt II Hunter BOSS rifle.

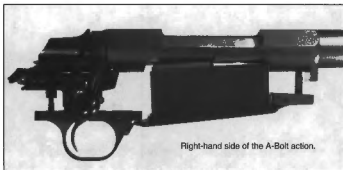
Precision accuracy from the BOSS system is achieved by calibrating your rifle caliber and ammo with a "sweet spot" setting. The "sweet spot" chart in the owner's manual lists average "sweet spots." These may vary between rifles of identical specifications with a given ammunition. Even one-quarter of a turn away from the "sweet spot" can cause a group to spread as much as one inch or more. We suggest you use our listed "sweet spot" setting as a starting point in determining the "sweet spot" setting for your particular rifle, then make adjustments accordingly. **Any change in BOSS setting may slightly alter your rifle's point of impact.** It's recommended you set the BOSS "sweet spot" setting before sighting in your rifle for windage and elevation. The BOSS was tested in full turn, one-half and one-quarter turn increments. Tighter groups may be achieved with the BOSS tested in other positions.

Full turn "sweet spot" settings or graduations are numbered 1-10 and inscribed on the barrel of your rifle. Smaller, one-tenth turn increments are inscribed at the rear of the locknut. To set the "sweet spot," the locknut is turned until it rests on the desired "sweet spot" number inscribed on your rifle's barrel. One-tenth turn increments are set by turning the locknut clockwise until the desired setting lines up with the hash mark on the barrel.

Suppose you have a 270-caliber A-Bolt rifle and are sighting in with 150-grain cartridges. Referring to the "sweet spot" chart, you will find the average "sweet spot" to be 6.0 for a 270 A-Bolt and 150-grain ammo. Turn the locknut until its edge lines up or rests on the marking for six on the barrel. Since the "sweet spot" is listed as 6.0, the 0 inscribed on the locknut should line up with the hash mark on the barrel. Your BOSS is now calibrated for the recommended "sweet spot."

If you desire to further experiment and possibly obtain even tighter groupings, turn the locknut one-quarter of a turn clockwise and fire your rifle at your target. If groups open up, turn the locknut counterclockwise and sight-in at different one-quarter turns until you are satisfied with your groupings. Again, "sweet spots" may vary between rifles of identical specifications with a given ammunition. As in any sighting-in process, best results are obtained through trial and error. Once your rifle is fine tuned to its "sweet spot," you will experience accuracy you never thought possible. You will need to re-tune the BOSS should you decide to shoot different brands, lots and types of ammunition.

Be sure to keep a record of your rifle's "sweet spots," especially if you use your



Right-hand side of the A-Bolt action.

rifle for different game and shoot different loads.

The nouns "sweet spot" could have been better named the ideal spot. To determine the ideal spot, you will have to do considerable test firing. The best way to do that is to fire from a solid bench rest in ideal weather at a target 100-yard distant. You will want a good scope on the rifle, and I would advise you to use ear muffs or ear plugs. If you are prone to flinch from recoil or noise, have another person do the firing. I would suggest you use five-shot groups rather than three-shot groups, and to make the test thorough it may require fifty or more shots to be taken. All of this is very important if you want to get the full measure of usefulness that the BOSS system will deliver or as Browning promises.

I find the model designations of Browning rifles a bit confusing. When I wrote the previous chapter back in the early 1980s, I knew the rifle as the BBR because it was marked as such. Later on it was called the A-Bolt. Anyway, if you have read the BBR chapter, you will have noticed a number of action features in that model that have been retained in the A-Bolt II model, and if you will compare them with the A-Bolt II

BOSS in this chapter, you will have noticed some differences already with more to come.

The A-Bolt II Action

The receiver is threaded up front to receive the barrel. The recoil lug is a separate part securely held in place between the shoulder on the barrel and the receiver. Remington has used this sort of recoil lug and fastening since 1948 with the introduction of their Model 721. The front part of the receiver, the receiver ring, is round at the bottom and machined partially octagon on top. The very top of the receiver and bridge, or a flat surface if the receiver had been machined a full half octagon, has been left the same radius as the bottom of the receiver. The receiver bridge is machined to the same dimensions as the ring with each of the surfaces level with those on the ring. The top surfaces are drilled and tapped for scope mount bases. Even after the machining has been done on and in the receiver for the bolt, magazine well and ejection port openings, it is still a very stiff part to adequately hold the free-floated barrel. Because the bolt has three evenly spaced locking lugs, three locking lug raceways,



Left side of the A-Bolt action.



A-Bolt action open.

with one at the bottom, have been cut lengthwise in the receiver. Then, of course, the rear end of the receiver is machined to accept the trigger mechanism, and the bolt shroud and bolt handle.

The bolt on the old model A-Bolt was smooth, and so was the bolt raceway in the receiver. The A-Bolt II has only three locking lugs, and the bolt body has three full-length matched ridges and the raceway in the receiver for the bolt has matching grooves. The bolt body could just as well have been called a sleeve—a non-rotating part between the bolt head and bolt handle section. These grooves end up front to form the locking shoulders for the bolt lugs. Having only three lugs instead of nine as in the previous model greatly shortened the space of the bolt head, which also shortened the receiver ring and shortened the travel the cartridge must take going from the magazine to the chamber. I am quite

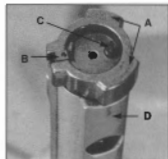
sure that the three locking lugs are equally as strong as the nine on the old model. Also, the ridges on the bolt body also serve as bolt guides as the bolt is opened and closed. On my rifle, the bolt slides easily and is entirely bind free no matter how the bolt is operated. The bolt head is fully recessed to encircle the cartridge rim. The simple claw extractor is well made and fitted, more so than in some other rifles with the same type of extractor. In this A-Bolt rifle, the ejector is a spring-backed plunger positioned at the edge of the bolt head recessed similar to the one in the Remington Model 700 series, and this is an improvement over the ejector used in the BBR as described in another chapter.

The bolt handle, extractor cam on the receiver bridge, bolt shroud (bolt sleeve), cocking piece, firing pin, mainspring, bolt shroud lock and spring are the same in this rifle as in the BBR described elsewhere. The

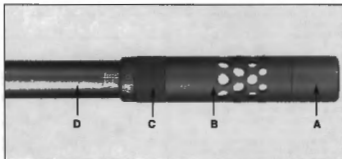
disassembly instructions for these parts as given in the BBR chapter are the same, but be advised that this is not an easy procedure. Incidentally, the bolt shroud is aluminum alloy.

The trigger mechanism is also a carry-over from the BBR model. It is attached to the receiver in the same manner as in the BBR, the safety is the same and the trigger has only one adjustment—that of weight of pull. The trigger housing is steel. Also carried over are all the magazine parts: hinged floorplate, detachable steel magazine box, trigger guard and the small parts that make up the complete unit. Trigger guard, magazine follower and floorplate are made of aluminum alloy.

There are three grades and two different action lengths of the Browning A-Bolt II, namely the Hunter model with a plain no-cheekpiece stock with the outside metal having a matte non-reflective surface; the Stalker



The A-Bolt bolt head showing: (A) two of the three locking lugs; (B) extractor; (C) ejector; (D) bolt face nooses.



The Browning's BOSS System device showing: (A) weight; (B) sleeves; (C) lock ring and (D) barrel.



Left-hand view of the Browning Hunter A-Bolt II BOSS rifle.

model with stock made of black fiberglass, a receiver made of stainless steel and the rest of the metal given a matted silver-gray finish; and the Medallion grade with a stock made of more showy wood, better checkering and a higher polish to the metal. Calibers for the three for the long-action model are: 25-06, 270, 30-06, 280, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., and 375 H&H Mag.; and for the short model are 223, 22-250, 243, 257 Robert, 7mm-08, 284 Win. and 308.

Comments

There is hardly any feature of the Browning A-Bolt II BOSS that I can criticize. I like its stock, and on the Hunter model I like the matte finish on the metal parts. In the calibers it is made, the recoil pad is not a bad idea. I like the smooth operating and bind-free bolt. Although I do not much like the looks of the cock-eyed and flattened bolt handle knob, it sure fits my hand between my crook trigger finger and the middle joint of my thumb—it has a natural fit. After adjusting the trigger to a three-pound pull, I find nothing to criticize. I know some shooters want a fully adjustable trigger rather than the single weight of pull adjustment on this trigger. I have run across many shooters who demand a fully adjustable trigger, who can't be satisfied with any trigger, and often, if not always, blame a missed shot on the trigger rather than admit it was their fault. I do prefer a safety that locks either the sear or striker, but I could get along fine with this one. I also like the magazine arrangement with the simple steel magazine box attached to the hinged floorplate, and the magazine can be easily detached from it. If the magazine is left attached when the rifle is put away, this almost guarantees that it won't be misplaced or lost. That often is a problem

with rifles having the usual detachable magazine.

I wonder why Browning did not choose to retain the recoil lug with its flat platform as used on the previous model of this rifle.

Markings

Stamped on the left side of the barrel is:
BROWNING ARMS COMPANY
MORGAN, UTAH & MONTREAL P.Q.
MADE IN JAPAN

Stamped on the right side of the barrel in one line is:

PAT. 4723369 & PEND.
A-BOLT CAL. 25-06 REM ONLY

Stamped on right side of receiver bridge is:
48027NW817

Note that no markings indicate that it is the A-Bolt II. However, the instruction booklet that comes with this BOSS-equipped rifle has in bold print **A-Bolt II** on its cover and inside. Therefore my designation for it is the A-Bolt II BOSS.

Additional Remarks

Unless a rifle nut like myself has ready access to a lot of rifles of many makes and models, such as a few large sporting goods stores might have, it is mighty difficult to keep abreast of and to examine and study new rifles as they are introduced. I have been unable to do this, and I must limit myself to the ones I can find. Of course I do keep abreast of the writings of other gun writers in magazines and books, but all too often when a new rifle comes on the market they as often as not fail to give the full details of the features of the rifle I want to know about—such as the action mechanisms covered by the stock. To take an example, during the time span between the issuance of the Browning BBR described in another chapter and my introduction to the A-Bolt BOSS in this

chapter, I know that several features of the BBR were changed before it was discontinued. So do not be too surprised to find that your BBR or your A-Bolt Brownings have somewhat different actions than I have described in these two Browning chapters. The Browning A-Bolt BOSS model I purchased in 1994, and which is shown here, is the Hunter model, the lowest priced model in this line.

My A-Bolt BOSS rifle is chambered for the 25-06, a cartridge which I have been familiar with for many years. My acquaintance with it started when it was known only as the 25 Niodner, and the few rifles I built for it were all astonishingly accurate. That was the reason why I bought the A-Bolt BOSS in this caliber. My son, Mark, and his father-in-law also have rifles for the 25-06, and because they have the facilities to test my rifle I gave the job to them. From the start I did not have to much faith that the BOSS system was all that the Browning literature claimed for it. One reason for my skepticism is that the very last rifle I built in this caliber could and did from the very start put not only three shots into one hole, but five shots in one hole at 150 yards, and this without any gadget on the muzzle to tinker with. Could the BOSS system do any better, I wondered? I doubted it. However here are Mark's comments:

"On firing the very first shots with the Browning BOSS, I immediately noticed two things: the lessened recoil and the increased muzzle blast. The recoil is definitely less than with any other 25-06 rifle I have ever fired. The Browning was very pleasant to fire in that respect. But the noise and muzzle blast was terrible, and I mean terrible. Dad (Frank) warned me that I should wear ear plugs and this I did, but they seemed not to help at all against the

PART II: Commercial Rifles & Actions



The Browning A-Bolt II Stalker rifle. Introduced in 1987. It has a fiberglass/graphite weather-proof stock; stainless steel receiver; matte silver-gray finish on 22" and 26" (mag.) barrels; caliber options of 270, 30-06, 7mm Rem. Mag. and 375 H&H; and a weight of 6½ to 7½ lbs.



The Browning A-Bolt II Varmint rifle (with BOSS). Same as the A-Bolt II Hunter except it has a heavy varmint/target barrel, laminated wood stock with special dimensions, flat forend and palm swell grip. Chambered only for 223 and 22-250. It comes with BOSS barrel vibration modulator and muzzlebrake system. Introduced 1994.



The Browning A-Bolt II Medallion rifle (with BOSS). Handsome detailing and fine finish. Rosewood cape on the grip and forend give the Medallion a look of distinction. Intricately engraved receiver flats add classic good looks. The hand-select walnut stock has a high gloss finish and sharp cut checkering. All metal surfaces have a deep lustre finish. Also made for left-handed shooters. Made in all calibers except 375 H&H with the optional BOSS.

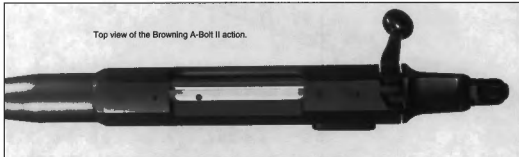
Dimensional Action Specifications

Action length	9.875" (long action)
Receiver ring diameter	1.375"
Bolt diameter	.865"
Bolt travel	(25-06) 4.313"
Striker travel	.250"
Guard screw spacing	7.938"
Guard screw threads:	
Front	¼ x 20
Rear	.185 x 24

General Specifications

Action type	Tumbolt repeater, operated by bolt handle.
Receiver	One-piece all steel construction, separate recoil lug, round bottom, part octagon on top, drilled and tapped for scope mount bases.
Bolt	Three-piece construction, triple forward locking lugs, low-profile bolt handle, separate non-rotating bolt body and recessed bolt face.
Ignition	One-piece firing pin (striker), coil mainspring, coiled on upturn of bolt handle.
Magazine	Detachable staggered-column box attached to hinged floorplate.
Trigger	Single-stage, adjustable for weight of pull.
Safety	Sliding type built in conjunction with trigger mechanism, locks bolt and trigger.
Extractor	Spring-backed hook extractor in bolt head.
Ejector	Spring-backed plunger in bolt head recess.
Bolt-stop	Pivotal, mounted on left rear of receiver, stops bolt by contacting locking lug.
Takedown	None provided.

Top view of the Browning A-Bolt II action.



blasts. So before I fired more shots, I carefully folded my soft leather gloves, placed them over my ears and then pulled my heavy stocking cap down over them. Still, the noise was terrible. My 25-06 Ruger rifle kicks more than the Browning, but the noise level is far less.

"As for the accuracy, well, it was nothing outstanding. I fired three shots with the BOSS sleeve removed and then fired three-shot groups with the sleeve adjusted to a different setting for each. The smallest group

was just over an inch. I fired only twenty rounds, so this was not a real test. Perhaps if I fired forty to sixty rounds, and did some more adjusting to the BOSS device, I might have found a setting which would produce tighter groups. Anyway, I'll take a 24" barrel and a slightly heavier one on a 25-06 over any BOSS-equipped rifle."

To close, I want to report on the results a friend of mine obtained with his 7mm Magnum Browning BOSS. He fired sixty rounds. Of course his rifle was scoped and fired from

a benchrest at 100 yards, as did my son. He reported much less recoil than another rifle in the same caliber. Then, when I asked about the noise level made by the Browning, he said it did not bother him hardly at all. As for accuracy, the smallest groups he obtained were about .750". Perhaps my friend used a good set of ear muffs, but of that I am not sure. Perhaps he did, but who wears them when hunting? From the above information, you can form your own opinion as to the value and usefulness of the BOSS device.



Browning BBR Rifle

THE BROWNING ARMS Company introduced their Model BBR high-powered bolt-action spotting rifle in 1978 after a period of several years in which they produced no rifles of this type. Previous to the BBR, Browning produced various calibers of centerfire rifles built on the three lengths of Finnish-made Sako actions (see the chapter entitled *Ruger Model 77 Mark II*) and on the famous Belgium-made FN Mauser actions (see the chapter about *FN Actions & Rifles*). For a source of Model BBRs, Browning has turned westward, for the BBR is made in Japan, the source of several other Browning firearms.

I have a high regard for the Model 98 Mauser action, especially so for the FN Mauser action as used by Browning and others. The FN actions that I have seen and used were well made, very functional and very reliable. Its major drawback was that it was designed to handle only cartridges of 30-06 head size, and that the receiver was weakened when the action was modified to handle longer cartridges than the 30-06. There was also no practical way to adapt the FN Mauser action to handle the 222 family of cartridges. I also have the highest regard for the three Sako actions—they are extremely well made and finished, they are about as light in weight consistent with strength as any turnbolt action can be made, and there is an action to handle almost any standard centerfire cartridge from the 17 Remington on up to the 375 H&H Magnum and 458 Magnum. The latest action

that Browning has adopted, the BBR, is a considerable departure from the FN Mauser and the Sako threesome.

The BBR Rifle

Let's take a look at the rifle first and then go on to the action. As first introduced, the BBR rifle is a full-sized rifle weighing around 8.5 pounds without sights or sling. It has a 24" round tapered barrel of medium sporter weight. The muzzle diameter is .600". Overall length of the rifle is 44.5". The stock is American walnut and styled somewhat similar to the Weatherby turnbolt rifle stock, with raised comb and cheekpiece, flared pistol grip and flat-bottomed forend. The stock has a high gloss finish and is checkered. The checkering on my BBR is coarse and not well done. There is a dark wood cap on the pistol grip, Pachmayr flush quick-detachable sling swivels, and Browning's own familiar pressed-horn buttplate fitted to the stock. On the two magnum calibers, a Pachmayr recoil pad is used. The receiver is drilled and tapped for scope mounts. No provisions are made on the barrel for open sights. The outside metal parts are well polished and blued. BBR calibers are 25-06, 270, 30-06, 7mm Magnum and 300 Magnum.

The BBR Action

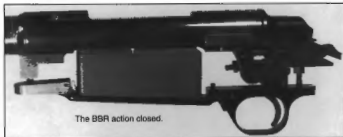
The receiver of the Browning BBR is round up front to accept the barrel. Between the shoulder of the barrel and the receiver is

the recoil lug. This lug is quite massive, and it not only serves to restrict rearward movement of the barrel and action in the stock, it has a flat area extending rearward to serve as a bottoming platform against the stock. In other words, it is a substitute for a flat-bottomed receiver and prevents the round receiver from wedging the stock apart when the front guard screw is tightened. This is a good arrangement.

The loading and ejection port in the receiver is more than ample in width to load the magazine from above, with the bolt open, although the magazine can also be loaded from below with the action closed by swinging the floorplate open. Additionally, the magazine can also be detached and loaded independently. On the bottom of the receiver, the magazine well is milled flat, and there are cartridge guide lips provided in the receiver as well as on the magazine box to hold the cartridges in place whether the magazine is loaded from above or below.

The receiver ring is round on top, while the receiver bridge is somewhat flattened to reduce weight. Both are drilled and tapped, two holes each for scope mounts. The left receiver wall is very rigid, it being approximately .250" thick, and it has no locking lug raceway to weaken it. However, because the receiver is round and because both the loading/ejection port and the magazine well opening are extra large, the rail on the right side of the receiver between the receiver ring and bridge is left very thin. This need not have been so—it could easily have been one-eighth or more thicker to reduce the width of the loading port that much.

The tang is short, and the right side of it is notched to accept the root of the bolt handle. This could serve as a safety lug. To extend the tang and provide a place to mount the sliding tang safety, the BBR has a steel block attached below the receiver tang, held there by a stud screw—a screw which also serves to accept the



The BBR action closed.

(Above) The pre-'82 Browning BBR rifle.

rear guard screw. This block also provides a flat bottoming surface against the stock just as the recoil lug does at the front of the action.

The BBR bolt is a three-piece affair consisting of the bolt head, the cylindrical and hollow body, and the bolt handle section. These three parts can be separated by the removal of two pins. More on this later. BBR's locking lugs are on the bolt head. There are three rows of them, nine in all, three in each row. The diameter of the bolt head over the lugs is the same as the bolt body, and this eliminates the need to have locking lug raceways machined inside the receiver. Browning has used a modern innovation in providing locking shoulders for the bolt head inside the receiver ring. They are not machined in as part of the receiver, rather, they are machined inside a separate sleeve and—with the receiver ring inside to accept this sleeve—the insert sleeve is press-fitted into place. The lower (left row when bolt is locked) locking lugs are wider than the other two rows, and this results in a wide path between the locking lug shoulders for cartridges fed into the chamber. The breech end of the barrel is flat, as is the front of the recessed bolt head. Inside this recessed bolt head is the ejector, a plunger and spring held in place by a cross pin.

The extractor is a tiny piece of metal that fits into and slides in a cut and a slit in the bolt face recess. It is given tension by a piece of spring wire inside the bolt head. For the very important job that it has to perform, it sure appears to me to be on the puny side. I have never seen another extractor quite like it, or as small.

The rear end of the bolt head slips into the bolt body, and the two pieces are held together by a heavy cross pin with a hole in it for the firing pin to pass through. A very similar arrangement is used in the bolt of the Sportco M44 rifle. I see nothing wrong with the arrangement, and I would prefer it over that of silver brazing the two parts together. The bolt body is a thin-walled tube with seven longitudinal grooves machined in its outside surface. Six of the grooves are shallow, and they do more to reduce friction in operating the bolt than to lighten it. The seventh groove is deeper and longer than the others—it is the groove in which the projection of the bolt-stop fits to guide the bolt upon opening and closing, and to stop the bolt in its rearward travel. The bolt-stop is mounted on the outside left of the receiver, and it is held in place and pivots on a screw threaded from the bottom up. The bolt-stop is a simple affair, and although it appears to be little more than adequate for the job, I would prefer it over the peg type as used on some other modern bolt-action rifles described in this book.

The third part of the bolt is the bolt handle section. As many of the other steel parts of this action appear to be, the bolt handle section



Attached between the receiver and barrel, the recoil lug serves two functions: as the recoil lug and as a bottoming platform against the stock. Browning also used a bedding compound in the recoil shoulder area for a close fit between metal and wood.

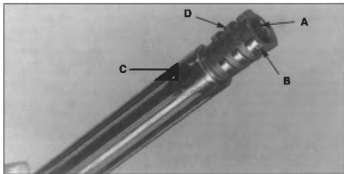
probably is an investment casting. It is anchored to the bolt body with a pin through the underside of the bolt body. A cocking cam notch milled into the rear of the bolt handle section cocks the striker on the upturn of the handle.

The bolt sleeve is of one-piece construction and threads into the bolt with right-hand threads. It is enclosed on the sides, top and back, but open below, and it is very neatly shaped to keep weight to a minimum. The firing mechanism consists of the one-piece striker, coil mainspring and the striker head. The entire underside of the bolt sleeve has a notch machined lengthwise through it so that the striker with striker head can slip in and out of it. This is not easily done since the mainspring is very stiff and is compressed between the front of the bolt sleeve and a collar on the front of the striker.

BBR's shotgun-styled sliding safety is a good one. Mounted in a separate block that is fastened to the underside of the receiver tang, there is plenty of room behind the bolt sleeve to operate it—even the top of the grip is hollowed out behind the safety so the shooter can

release it unhampered. A spring provides SAFE and FIRE positions for the safety. When the safety is rearward, a rotary cam in the trigger mechanism blocks the trigger so it cannot be pulled. On the same rotary lock is mounted a rod that projects upward into the notch for the bolt handle, locking the bolt closed. Although not entirely silent, the safety is not noisy when moved to the FIRE position.

A windowed steel housing contains the trigger mechanism, and it is attached to the bottom of the receiver by a cross pin up front and by the safety block at the rear. The mechanism is built on the same principle as the common Timney and similar triggers in that it contains a sear, a trigger that engages with it, and the necessary pins and springs. The BBR trigger mechanism, however, has only a single adjustment—a screw and locknut to adjust for weight of pull. The stock has to be removed to make this adjustment. The trigger spring and the area where the trigger engages with the sear are visible through holes on either side of the trigger housing. The cam stud on the trigger that engages with the safe-

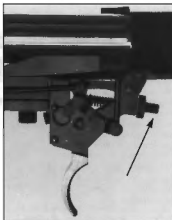


The BBR bolt head showing: (A) ejector, (B) extractor, (C) pin which holds bolt head to the bolt body, and (D) one row of locking lugs.

PART II: Commercial Rifles & Actions



The sliding tang safety of the BBR is conveniently placed, and the cocking indicator projecting below the contoured bolt sleeve can be felt and seen.



The BBR trigger mechanism with arrow pointing to the weight-of-pull adjustment screw. Turning it counter-clockwise reduces the weight of trigger pull.

ty cam is also visible, as is the bolt lock rod. The trigger let-off in my BBR rifle has a trifle too much take-up and over-travel, as well as a bit of roughness in the take-up. It seems to me that Browning would have been wise to have provided adjustments for take-up and over-travel in this mechanism.

The trigger guard bow is made of an alloy and is held in its inletted area in the stock by the rear guard screw and by a screw up front. It is very neat in shape, and the trigger is well positioned in it.

Perhaps the most outstanding feature of the BBR is its magazine. It is not new with Browning, because I have seen a similar magazine on a custom-built rifle, although I believe it is the first time such a magazine system has been used on a commercial model. To describe this magazine briefly is to say that it is a semi-detachable, staggered-column, box magazine attached to the hinged floorplate. It can be loaded through the open action or from below with the floorplate swung down or with the magazine detached. Also, the magazine box, if it is never detached, won't get lost or misplaced.

The BBR floorplate is hinged to a plate through which the front guard screw passes, and this holds the assembly in place. The hinge plate is steel; the floorplate a lightweight alloy. A latch built in the front of the trigger guard holds the floorplate closed. The magazine box consists of a thin steel shell with a removable steel bottom, and inside it is an alloy follower and a cross-legged follower spring. In the front of the box there is an alloy block which serves as the feed ramp. The box has curved-in cartridge guide lips to hold the cartridges in place, yet they allow the cartridges to be easily

stripped out by the bolt or fingers. Lastly, the magazine box can be easily and quickly detached from the floorplate—it's held in place by a lip engaged in a slit at the rear and by a spring-backed plunger up front. To detach the magazine box, merely lift the front end of the box up and, presto, it is in your hand. The box is easily taken apart for cleaning. It seems to be a very practical magazine system.

You may wonder at my description of the follower spring. Well, it is a cross-legged affair with one leg hinged to the rear of the follower and both legs hinged together in the middle, with a small torsion spring on the center hinge pin to keep the legs crossed and the follower under pressure. The cross legs hold the follower at a constant level position without binding. It is unlike any other follower spring mechanism that I have ever observed.

Here I must also mention four other features found on the BBR. The first one visible from the outside is the cross pin or dowel through the stock at the recoil shoulder area. The use of this pin in this area will almost certainly prevent the stock from splitting due to recoil. The second feature is the use of an epoxy compound at the inletting area of the recoil lug. Its use here assures a perfect fit of the recoil lug against the stock. The next feature has probably never been used before on a commercial rifle. It is a forend stiffener or anti-warp feature—an 8" U-channel made of aluminum epoxied in a groove in the forend. The channel is probably no heavier than the wood removed to put it in place. I doubt if this feature will be of much value, although knowing a bit about the wood that Browning has been using of late, the channel may help stabilize the forend. The last feature is that the

barrel is free-floated, which means that the forend channel is made deep and wide enough so that it does not contact the barrel. A rifle with a free-floated barrel generally retains its zero much better than a rifle with a barrel pressure-inletted into the forend. A free-floated barrel stays sighted-in regardless of weather conditions, or how the rifle is held when fired, or whether or not a sling is used when firing—all provided the barrel is not rested on or against something. Often, but not always, a free-floated barrel delivers the best accuracy possible.

At the time I purchased my BBR, the store where I bought it had several more in stock. In going over my rifle, I noticed the cross pin through the stock projected slightly on both sides of the stock and that the buttplate also extended beyond the edge of the stock. This seemed to indicate that the stock had shrunk after it was finished. Then I checked the other BBR rifles and I noticed the same condition on them. Anyway, I am glad my rifle has an anti-warp metal channel in its forend, although I fear that if the stock shrinks any more the forend will split down the center.

Takedown and Reassembly

Always, when handling a turnbolt rifle, whether in a sporting goods store, in your home, in a hunting camp or wherever, open the bolt and make sure the rifle is unloaded.

To remove the bolt, open it, press the front end of the bolt-stop down and slide the bolt rearward, out of the action.

To disassemble the bolt, proceed as follows: 1) Make a simple tool to hold the striker back. Take a 6" piece of $\frac{3}{16}$ " rod and bend it in the middle to form a two-tined fork, with the fork spaced to enter into the space under the bolt sleeve on each side of the striker in front of the cocking head. 2) Grasp this tool



In a groove inside the forend, Browning has inserted an aluminum channel to stiffen and stabilize the forend.

tightly with it in place, pull back on it and at the same time unscrew the bolt sleeve from the bolt counterclockwise. Do this one turn at a time, keeping the tool in place. After several turns, when the cocking head no longer touches the bolt, leave the tool in place and completely unscrew the bolt sleeve. 3) If you want to remove the striker from the bolt sleeve you need another tool to hold the mainspring compressed. Make this tool from a piece of $1/4$ " rod about 5.25" long and bend each end up $1/2$ ", leaving a space of 3.37" between the bent ends. File the ends a bit as needed so the tool won't slip off. 4) Place this tool with one end behind the mainspring in the slot of the bolt sleeve and the other end over the edge of the shoulder on the striker. This will compress the mainspring away from the bolt sleeve and, with the tool in place, lift off the bolt sleeve. If you want to remove the mainspring, drive out the pin from the cocking head to remove that part. 5) To reunite the striker and bolt sleeve, use the spring compressor tool as before, slip the bolt sleeve in place, insert the fork tool in place in the bolt sleeve, remove the spring compressor tool and you are ready to reassemble the bolt sleeve with striker back into the bolt.

After the striker assembly has been removed from the bolt, the bolt head can be removed from the body by driving out the large pin that holds these two parts together.

To separate the bolt handle section from the body, use a drift punch through the hole in the rear upper side of the bolt and drive out the stud at the opposite side of the bolt. I would advise against the removal of the ejector and extractor.

Remove the stock by turning out the rear and front guard screws and, with bolt open, carefully hand force the barrel and action evenly out of the stock. The bolt-stop can be removed by turning out its small screw. The safety and trigger mechanisms can be taken out by removing the rear guard screw stud and the safety mounting block, and then driving out the cross pin at the front of the trigger housing that holds it to the receiver. Turn out the screw in front of the trigger guard and the guard can be removed from the stock. Lift the floorplate assembly from the stock. Disassemble the magazine box by first removing it from the floorplate and by lifting its front end up and away from the plate. Then slide the loose bottom of the box rearward and out, after which the follower and follower legs can be removed. Reassemble in reverse order. The barrel and recoil lug are threaded very tightly in place, and unless you have the proper equipment and the skill for this operation, no attempt should be made to remove the barrel. You should also not attempt to take the trigger mechanism apart unless you are skilled in working with small pieces.

Markings

The Browning BBR rifle is marked as follows: Stamped in small letters on the left side of the barrel is:

BROWNING ARMS COMPANY MORGAN, UTAH
& MONTREAL, P.Q.
MADE IN JAPAN

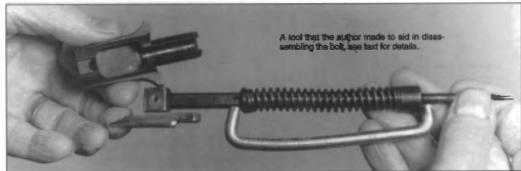
The model designation and caliber is stamped on right side of barrel as:
BBR CALIBER .25-06 ONLY

The serial number is stamped on the right side of the receiver ring. The letters NP are stamped on the bolt head and on the barrel shoulder.

Comments

Browning firearms have long been held in high esteem among shooters the world over. In years past, if you owned a Browning automatic shotgun or their over/under, or their 22 automatic rifle or one of their pocket pistols, you owned the finest—the finest in design and workmanship. I can't in truth say that about the BBR rifle, or be overly proud of it. The former Belgium-made Browning high-powered turnbolt rifle built on the FN Mauser action was a finer crafted rifle. Although it had a poorly designed and shaped stock and an oddly contoured barrel, it was better made and finished inside and out. As for the BBR, outwardly it is a fine looking arm, and while the overall design of the action, barrel and stock is what the American shooter likes, the workmanship that one expects of Browning is not there. True, every BBR owner is not going to look inside the rifle as I did or be so critical about small things and thus that do not affect the safety or shooting qualities of the rifle, but just the same the BBR could have been made better.

The following are a few of the things I did not like on the BBR I purchased. The stock had shrunk and that indicates that the wood was not properly seasoned or dried. The checkering had over-run; its surface was very uneven and the work poorly done. The



A tool that the author made to aid in disassembling the bolt, see text for details.

PART II: Commercial Rifles & Actions

inletting showed hardly any handwork; five minutes more with a piece of sandpaper could have removed most of the machine marks and splinters from the raw edges. The funnel crown in the muzzle is not the way I like my barrels crowned. I would have liked two more adjustment screws on the trigger mechanism.

I would like to see a better and stronger extractor in this action. I would also like to see twice or triple the amount of metal in the right receiver rail. Lastly, I don't particularly like the machining done on the bolt head and inside the locking shoulder insert.

The BBR is a large action that is ideally sized for 30-06-length cartridges. It is a very strong action, and those nine locking lugs and shoulders on the bolt and in the receiver locked together will hold a tremendous amount of pressure. It is a good looking action, too, and I especially like the graceful lines of the bolt sleeve. The bolt is easy to operate, slides backward and forward smoothly, and feeds cartridges from the magazine into the chamber without a hitch. The magazine is easy to load and unload, and by swinging the magazine down it can be refilled while there is a loaded cartridge in the chamber. The magazine can't be dropped or lost in the process.

Many hunters will say that this rifle is a bit on the heavy side to carry all day. For myself, especially in the standard calibers, I would prefer that the stock have less wood; perhaps patterned after the classic Griffin & Howe style. However, stocked as it is, and weighing what it does, it is a comfortable rifle to fire, even in the magnum calibers. As is, in the 25-06 caliber, it can be put into the class of a long-range varmint. The free-floated barrel



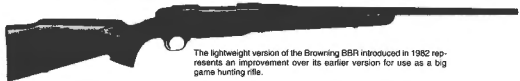
The magazine of the BBR can be loaded in three ways: through the ejection port with the bolt open, with the magazine box detached, or with floorplate swung open and magazine box attached as shown here. In the last two instances, the action can be left closed and the chamber loaded.

is a good feature, as is the epoxy bedding of the recoil lug area and the cross pin through the stock.

As mentioned before, I like the BBR bolt sleeve and the clever arrangement used to put the cocking head and striker inside it. The arrangement makes it very difficult to disassemble the bolt, but I have had a rifle or two around the house for forty years or more without my having a need to take those bolts apart.

I also like the three-row arrangement of the locking lugs which results in them unlocking in only a 60 degree turn of the

bolt. This results in a short uplift of the bolt handle, and the advantages of this are threefold: 1) It speeds up bolt operation. 2) On the full uplift of the bolt handle, a lot of clearance is left between it and the scope, so a full grip can be maintained on the handle when operating the bolt without danger of the fingers becoming bruised or cut on the scope's eyepiece. This is especially important when a wide-field scope is on the rifle. 3) The short uplift also makes possible a minimum cut in the stock to allow the bolt to close. On this rifle the cut is less than half



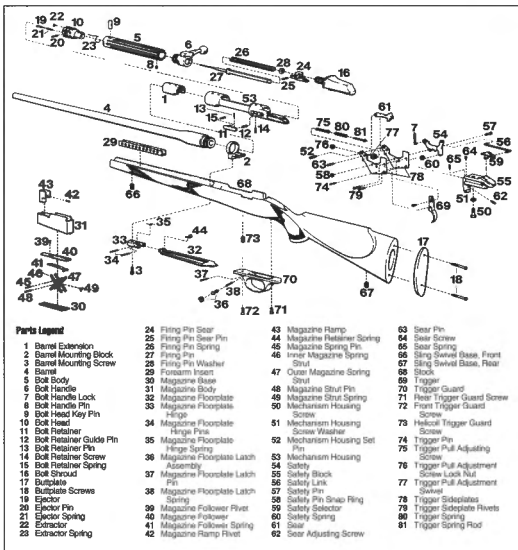
The lightweight version of the Browning BBR introduced in 1982 represents an improvement over its earlier version for use as a big game hunting rifle.

Dimensional Action Specifications

Action length	.....9.875"
Receiver length	.....8.750"
Receiver diameter	.....1.375"
Bolt diameter	......875"
Bolt travel	.....4.375"
Striker travel	......250"
Bolt face recess depth	......132"
Magazine length (inside)	.....3.380"
Front guard screw	.....14 x 20 tpi
Rear guard screw	.....10 x 24 tpi

General Specifications

Action type	.....Tumbolt repeater.
Receiver	.....Round one-piece steel construction, solid bridge, tapped for scope mounts, separate recoil lug fitted between barrel and receiver.
Bolt	.....Three-piece construction, nine locking lugs in three rows at forward end, low-profile bolt handle.
Ignition	.....One-piece striker, coil mainspring, cocks on opening of bolt, 60 degree bolt lift.
Magazine	.....Staggered-column detachable box magazine attached to swing-down floorplate, can be loaded and unloaded swung down, through the receiver, or detached.
Trigger	.....Single-stage, adjustable for weight of pull only.
Safety	.....Shotgun type sliding tang safety, locks trigger and bolt.
Extractor	.....Sliding extractor fitted in bolt head.
Ejector	.....Plunger type fitted in bolt head.
Bolt-stop	.....Separate bolt-stop on left of receiver with projection that fits in length-wise groove in the bolt.



the depth than that on a number of other rifles which have the 90 degree bolt handle uplift necessary with locking lugs on the bolt. The advantage of the shallower notch is that the stock is not weakened so much at this point.

All-in-all, considering the very welcome magazine system, and the other novel features of this action such as the bolt sleeve and striker arrangement, the three-piece bolt construction, and a recoil lug that doubles as a

flat-bottomed receiver, all add up to make the Browning BBR action a unique one.

A Model Change

News came to me just as I finished this chapter that Browning has introduced a lighter version of the BBR to replace the original version. This new version has a lighter and shorter barrel (22" long and a muzzle diameter of .600") and a slimmer forearm to affect a reduction of weight (8 pounds vs. 8.5

pounds). In other respects, the lighter version is almost the same as the early heavier model, and it does away with one of the criticisms I had regarding the early model. Browning calls this new rifle their Lightning Bolt.

According to the information I have, the BBR Lightning model, as well as other BBR models, were discontinued in the mid-1980s and replaced by the A-Bolt model. One of the A-Bolt models is covered in another chapter.



BSA Royal, Majestic, Monarch, and Herter's U9 Rifles

THE BIRMINGHAM SMALL ARMS Co., Ltd., the well known British gunmakers of Birmingham, England, first displayed an interest in producing a quality bolt-action sporting rifle for the American market shortly after the end of WWII. Their U.S. representative at that time was Jack Warwick, who busied himself gathering ideas for the proposed new bolt action, on which the rifles were to be made. A prototype action was developed and made, and a rifle assembled on it. It was shown to several gun authorities in the U.S. As expected, some faults and undesirable features were found in this sample rifle and action. Warwick, fortified with suggestions for its further improvement, went back to England.

BSA engineers studied the suggested changes and modified the action accordingly. In 1954 BSA introduced a pilot version of a varmint rifle.

This was the first "Royal Line" rifle to be introduced, though they were not so named at this time. This was based on a short action, with medium- and long-actioned rifles to follow, hopefully.

The BSA Short Action

The first BSA modern bolt-action center-fire rifle, initially made only for 22 Hornet and 222 Remington cartridges, had a remarkable action in a number of ways. It was short—only long enough to adequately handle the 222 cartridge, which was by that time a highly popular varmint and benchrest target round (my guess is that this action was about 7" long). The receiver was very heavy and massive, its ring 1.350" in diameter, which is larger than the "large ring" M98 Mauser. The bolt, of .700" diameter, had solid dual-opposed forward locking lugs, and the long Mauser-type non-rotating extractor. The breech end of the barrel was counterbored to form a ring or collar to sur-

round the bolt head, the ring slotted for the extractor. The round-knobbed bolt handle (of low scope profile) base formed the third or safety lug, engaging a notch in the tang. The firing mechanism was entirely new, featuring a compact bolt sleeve, two-piece striker/firing pin, and a rotary safety in the bolt sleeve.

This new action also had a staggered-column box magazine, hinged magazine floorplate and an adjustable trigger mechanism that held the bolt-stop and ejector. Integral dovetails on the receiver ring and bridge provided anchorage for special Parker-Hale clamp-on scope mount rings. All in all, it was a well-designed and constructed action. Its most notable and impressive feature was the heavy receiver, massive and rigid enough to support a heavy free-floating barrel. Its most obvious fault was the absence, either on the receiver or scope mount rings, of any means to prevent the scope rings from sliding on the straight dovetails. No gas escape holes were provided in the bolt or receiver either.

These original BSA rifles, 22 Hornet or 222, had 24" round tapered barrels fitted with ramp front sights. The very neat stock, of French walnut, had white-line spacers under the black plastic buttplate and pistol grip cap, a low Monte Carlo comb and forward slanted cheekpiece, straight tapered forend, the latter nicely checkered as was the grip. The rifle weighed about 7.5 pounds.

The BSA Medium Action

In 1956, BSA introduced a new rifle with a medium length action. In the interim, some changes and improvements were made which were incorporated into the new medium length action; apparently those short actions made after 1956 also were made with most of these changes. Essentially the new medium action was merely a

longer version of the short action, long enough to handle cartridges up to 2.875" overall. The same heavy receiver was retained, except that it was made longer (again, my guess is that this action was 7.75" long), plus a few other changes. Most important was a hole in the top of the bridge scope-mount dovetail. A matching stud under the rear scope-mount ring engaged this hole to prevent longitudinal movement of the scope mounts from recoil. Instead of the barrel breech being counterbored to shroud the bolt head, the new medium receiver was made with an integral ring or shoulder to surround the bolt head, and against which the barrel abuts. This ring, slotted on the right for the extractor, which greatly strengthens the receiver ring, is a direct copy of the M98 Mauser ring. (While I am quite sure that the first of these medium actions had this feature, I'm also convinced that it was soon dropped in favor of the counterbored barrel—which in effect served the same purpose by enclosing most of the bolt head. At any rate, I believe the integral inside receiver ring feature was dropped before the long BSA action was introduced, which had a counterbored barrel.) Another feature of the new medium action was a guide rib on the bolt body which, when the bolt handle was raised, contacted the left receiver raceway, which, helped prevent the bolt from cramping during operation. The action was also made safer via two gas-escape vent holes in the bolt and one in the receiver ring.

The new medium length actioned rifle was originally offered in 257 Roberts, 7mm (.7x57) Mauser, 300 Savage and 308 Winchester (7.62 NATO).

(Above) A typical example of a BSA rifle made prior to 1960.

General specifications of this rifle match the short-action rifle except that the forend was more tapered, slimmer, and finished with a schnabel tip. There was also a three-leaf open rear sight.

The Long Action

The long-action BSA rifle was introduced in 1957. This action is 8.625" long overall. By this time BSA was calling these rifles the "Royal Line." In addition to offering rifles in new calibers suitable to the long action, BSA also introduced a "featherweight rifle," and so designated it. It also appears that at about this time J.L. Galef & Son, Inc. became the importers and U.S. distributors of this line.

The BSA long action was merely a longer version of the medium length action to accommodate cartridges of 30-06 length. Its magazine handles cartridges no longer overall than 3.375".

The standard-weight rifles had a 24" barrel and a receiver with a thick left wall; that is, the left side of the receiver was flush and in line with the receiver ring. The new Featherweight models, made with both medium and long actions, had 22" slim tapered barrels and receivers on which the left wall, between the bridge and ring, was milled thinner.

In addition to the lighter barrel and receiver, the stock was routed out in places to reduce weight. Lastly an efficient barrel muzzlebrake was included. This brake was made by boring out a section of the bore at the muzzle, then cutting several narrow gas-escape slots, one each side of the muzzle, to coincide with the bored-out cage.

The long action standard-weight rifle was available only in 30-06. The long-action Featherweight was offered in 270 Winchester, 30-06 and 458 Winchester Magnum; the medium-action rifle in 243 and 308. The 458 Magnum rifle weighed about 8.5 pounds, while the same rifle weighed only some 6.25 pounds in the other calibers.

The entire "Royal Line" BSA rifles was discontinued about 1959 and the "Majestic" rifles, with some improved action features, were introduced. Before discussing the latter line, I'd like to present a detailed study of the Royal action as made from about 1956 to 1959. Except that the short, medium and long actions are of different lengths, and that the Featherweight receiver has a thinner side wall, the following description is applicable to all.

Before going into detail I must say I have only thoroughly examined two rifles of the Royal Line; both were lightweight versions in 30-06 caliber, their receivers 8.625" long.

I've never had an opportunity to examine the short or medium actions and, since I have found them to be exceedingly scarce, I've



The "long" BSA Royal Line action.

concluded that few rifles on these actions were made. I doubt very much if any of these actions were ever sold separately, although perhaps some were sold in Canada.

The BSA Royal Action

The receiver is precision machined from a solid steel billet. Its bottom is flat, with the recoil lug at the extreme front end. The receiver ring is threaded to accept the large barrel shank, which has right-hand V-type threads.

Except perhaps for a few of the first made, the receiver does not have the M98-type internal ring or collar; instead the breech face of the barrel is counterbored to form a shroud around the bolt head. The rim of this recess is cut away on the right for the extractor. The receiver is not slotted for loading the magazine with a stripper clip.

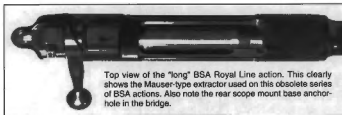
The bridge is about the same width as the ring. Both, flat on top, are made to form integral dovetail scope-mount bases. The dovetail is about .775" wide on top and is untapered. A shallow hole, about .200" in diameter, in the bridge dovetail, takes a stud in the rear scope-mount ring, thus securing the mount against movement caused by recoil. Two tapped holes in the left side of the receiver provide a means to attach a receiver sight.

On the Featherweight models the left wall of the receiver between the ring and bridge is cut down quite thin to reduce weight. On the standard weight model the left side of the

receiver is about straight. The loading ramp at the front of the magazine well is made with two shallow rounded grooves rather than with a single cartridge path.

The bolt follows M98 Mauser design quite closely. Dual-opposed solid locking lugs on the head of the bolt engage behind shoulders cut into the receiver ring. The bolt head is partially recessed for the rim of the cartridge head; part of the left side is built up, its inside recess undercut so the extractor will securely hold the cartridge or case in place for proper extraction and ejection. The long one-piece Mauser-type extractor is held against the bolt by a collar encircling the bolt, with the ends of the collar flanged to engage in a mortise cut in the underside of the extractor. The extractor collar is of two-piece construction and, when in place on the bolt, the two halves are linked together by a double notch arrangement. This collar is easy to remove and replace without being sprung out of shape. A projection near the head of the extractor engages in a groove cut part way around the bolt head, which prevents longitudinal movement of the extractor.

The bolt handle is at the extreme rear end of the bolt; its base forms a safety lug by engaging a notch cut into the tang. The base of the bolt handle also provides primary extraction power, its beveled surfaces camming against a matching surface on the rear of the bridge. The low bolt handle will clear the lowest-mounted scope.



Top view of the "long" BSA Royal Line action. This clearly shows the Mauser-type extractor used on this obsolete series of BSA actions. Also note the rear scope mount base anchor-hole in the bridge.

PART II: Commercial Rifles & Actions



BSA caliber 30-06 Featherweight model on the Royal line—pre-1959 (long action). This rifle is fitted with a Redfield 4x Bear Cub scope in the excellent Parker-Hale "roll-off" mount rings, which fit the male dovetails milled into the receiver.

Adequate gas-escape vents in the bolt and receiver protect the shooter from escaping gases in the event of a ruptured primer or case head. A small hole is provided under the right (lower) locking lug, with a matching hole cut through the left of the receiver ring. This set-up will take care of minor gas escape around the firing-pin tip. A larger hole, back on the bolt body at the intersection of the mainspring shoulder on the firing pin, will direct additional gases downward into the front of the magazine. There is also a small hole through the head of the extractor to prevent gases from forcing the extractor head outward should gas be directed in its direction. The bolt sleeve is sufficiently flared to the left to seal off the left locking lug raceway should gases escape that far back.

The bolt is made with a semi-guide rib which extends from the extractor collar rearward about 2.6". When the bolt is opened the edge of this rib contacts the lower edge of the left locking lug raceway, which prevents the bolt from being turned any further. It also helps prevent any binding of the bolt when the action is operated. The very smooth bolt body is a snug fit in the receiver, and even with the bolt opened and drawn back, very little end play or wobble exists.

The bolt-stop, in the top part of the trigger mechanism pivots on the trigger housing-pin. The front end of the stop projects into the receiver, and under spring tension is pushed up into an oblong notch cut into the bottom of the bolt body, just forward of the extractor collar when the bolt is opened. When the striker is down, pulling on the trigger causes the bolt-stop to remain down so the bolt can then be opened and withdrawn. The bolt-stop also locks the bolt closed when the safety is ON by the action of the safety drawing the striker head off the sear, allowing the sear and bolt-stop to rise and allowing the bolt-stop to engage the bolt locking notch cut into the rear bottom of the bolt body. The bolt-stop also functions as the sear, which function will be discussed later.

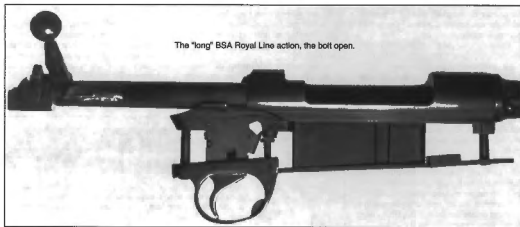
The ejector is a thin piece of hardened steel located in the bottom of the receiver, lying partially in the trigger housing. Held in position on the trigger housing-pin, it is under tension of a small coil spring. The bolt head is slotted to allow the ejector to rise behind the cartridge head on opening the bolt; this bottom slot is slightly to the left of the bolt head. Cartridges/cases are ejected to the right.

The firing mechanism is quite simple. The bolt sleeve threads into the rear of the bolt.

The striker fits through the bolt sleeve and the mainspring is compressed over the striker rod between the bolt sleeve and firing pin tip which fits over the end of the striker rod much in the same way as on the Model 1903 Springfield. The flat striker head is an integral part of the striker rod. The rotary wing safety, positioned through the bolt sleeve, engages a milled cut in the striker head. A small spring and plunger lying in a hole in the left side of the bolt sleeve provide tension to hold the safety in place and in the OFF position. The mainspring is quite strong and the striker assembly very light, which makes for fast lock-time and positive ignition. The striker head, engaging a notch in the rear of the bolt, cocks the striker on opening the bolt.

The magazine box is a folded sheet-metal stamping, the ends welded together at the front. The top is gently tapered to fit easily into the magazine well. It is loosely held in place against the receiver by the floorplate. Two vertical ridges, pressed into the sides of the magazine box just forward of the shoulder location of the cartridges, hold the cartridges to the rear of the box and prevent battering of the bullet points from recoil.

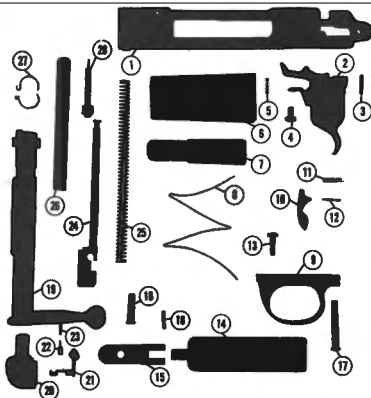
The alloy trigger guard bow is the only non-steel part. The floorplate is hinged to



The "long" BSA Royal Line action, the bolt open.

Parts Legend

- 1 Receiver (top view)
- 2 Trigger-mechanism group
- 3 Trigger-housing pin
- 4 Trigger-housing screw
- 5 Ejector spring
- 6 Magazine box
- 7 Follower
- 8 Magazine spring
- 9 Trigger guard
- 10 Floorplate catch
- 11 Floorplate catch spring
- 12 Floorplate catch pin
- 13 Front trigger guard screw
- 14 Floorplate
- 15 Floorplate hinge plate
- 16 Floorplate hinge pin
- 17 Rear trigger guard screw
- 18 Front guard screw
- 19 Bolt
- 20 Bolt sleeve
- 21 Safety
- 22 Safety plunger
- 23 Safety plunger spring
- 24 Striker
- 25 Mainspring
- 26 Extractor
- 27 Extractor collar (two parts)
- 28 Firing pin



BSA Royal

Dimensional Action Specifications
(ring action only)

Weight	38 oz.
Length	8.625"
Receiver ring dia.	1.350"
Bolt dia.	.700"
Bolt travel	4.675"
Striker travel	.300"
Magazine length	3.480"
Bolt face recess	.055"
Guard-screw spacing	8.00"

Dimensional Action Specifications
(Majestic)

Same as for the Royal except:	
Action length:	
Long	7.75"
Medium	7.00"

General Specifications

Type	Tumbler repeater.
Receiver	One-piece machined steel. Non-slotted bridge. Integral dovetail scope mount bases machined on ring and bridge.
Bolt	One-piece with dual-opposed forward locking lugs. Handle acts as safety lug.
Ignition	Firing mechanism consists of striker, coil mainspring and separate firing pin. Cocks on opening.
Magazine	Staggered-column non-detachable four-shot box type. Hinged floorplate.
Trigger	Single-stage, adjustable for weight of pull and creep (sear engagement). The grooved trigger can also be adjusted to make a double-stage pull.
Safety	Rotary, in right side of bolt sleeve. UP is the OFF or FIRE position. Tipped back is ON or SAFE locking both striker and bolt.
Extractor	One-piece Mauser-type spring, attached to the bolt by two-piece collar.
Bolt stop	Pivotal, mounted in trigger housing, bolt released by pulling the trigger.
Ejector	Within the trigger mechanism.

BSA Majestic

General Specifications

The same as for the Royal except as follows:	
Ejector	Spring and plunger type built into bolt head.
Extractor	C-clip type built into the bolt head.

the front guard screw plate. A latch, under the tension of a small coil spring and located in a slot in the front of the guard bow, holds the hinged floorplate closed. A screw through the front guard screw plate, threading into the recoil lug, and another through the rear of the guard bow, threading into the receiver tang, securely hold the barrel and action in the stock. Besides the rear guard screw, the guard bow is also held in place in the stock by a screw through the inside of the stock inletting into the front of the guard bow.

The inside of the floorplate and the underside of the milled follower are grooved to accept the ends of the magazine follower spring to hold these parts together.

The Royal Trigger

The trigger mechanism comprises several small parts housed in a sheet-metal box, and this box is attached to the underside of the receiver by a screw and pin. As previously mentioned, the ejector and sear, which is also the bolt-stop, are fastened in the trigger housing. The ejector is tensioned by a small coil spring. The sear (as it will be called now in describing the trigger mechanism) is supplied upward tension by the trip lever spring, with both the ejector and sear held in place by, and pivoting on, a bushing through holes in the trigger housing. A pin through the ejector and sear bushing helps hold the trigger mechanism to the receiver.

The trip lever, located directly under the sear, pivots on a small pin through the housing. The trip lever is held upward by a small spring, which in turn provides the upward tension to the sear. Pivoting on a pin and tensioned by a spring, the trigger pawl is positioned vertically between the trigger and the trip lever. Notches in the top of the trigger pawl and in the rear end of the trip lever engage each other when the action is cocked, which engagement forms the "sear" in the trigger mechanism itself. The trigger, positioned in the bottom of the trigger housing, pivots on a pin through the housing.

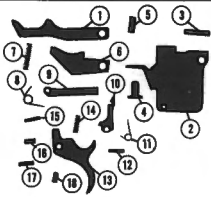
A small but rather sturdy coil spring, backed by an Allen-head setscrew in a hole in the base of the trigger, supplies tension to the trigger as well as providing a means to adjust the weight of pull. A similar setscrew through the top front of the trigger housing can serve to limit the trigger sear engagement, limit the take-up travel of the trigger or, if adjusted to increase trigger travel, the trigger can be adjusted to a double-stage pull. The rear top arm on the trigger contacts a shoulder on the trigger pawl and, when the trigger is pulled, the trigger pawl is tipped forward.

Essentially this is a three- or four-lever (four levers if the trigger is counted) self-

BSA Trigger Mechanism

Parts Legend

- 1 Ejector
- 2 Trigger housing
- 3 Trigger-housing pin
- 4 Trigger-housing screw
- 5 Sear/ejector bushing
- 6 Sear (also bolt-stop)
- 7 Ejector spring
- 8 Sear trip-spring
- 9 Sear trip
- 10 Trigger pawl
- 11 Trigger-pawl spring
- 12 Trigger-pawl pin
- 13 Trigger
- 14 Trigger spring
- 15 Sear trip-pin
- 16 Trigger stop-screw
- 17 Trigger pin
- 18 Trigger weight-of-pull adjustment screw



setting trigger mechanism: the three levers merely reduce the very heavy pressure of the mainspring on the striker step-by-step downward through the sear, trip lever and trigger pawl so that the pressure on the trigger sear is only a fraction of that supplied to the striker. In this way a short and safe trigger pull can be achieved and still have a firm and positive engagement between sear and striker.

The trigger functions as follows: when the bolt is opened the trip lever spring pushes the trip lever and sear upward, placing the sear in front of the striker head. As the trip lever pivots upward the trigger pawl pivots backward as their sears engage. When the bolt is closed, the striker is held back, in turn, by the sear, trip lever and trigger pawl. Then, on pulling the trigger back the trigger pawl is tipped forward, releasing the trip lever, sear and finally the striker.

Turn the trigger weight-of-pull adjustment screw in (clockwise) for a heavier pull, and vice versa. This can be done with an Allen wrench through the guard bow without disassembling the rifle. The trigger-travel adjustment screw can only be reached by removing the barrel and action from the stock. This adjustment is normally set at the factory for a minimum single-stage take-up. However, turning this screw in (clockwise) reduces the take-up, and vice versa. If turned far enough out, it alters the trigger to a double-stage pull.

The trigger mechanism is used to disengage the sear (bolt-stop) so the bolt can be removed. Here is what takes place: To begin with the bolt must be closed and the striker let down, leaving the sear pivoted below the bolt. To withdraw the bolt the sear must be held down in this position,

which is done by pulling back on the trigger firmly and holding it back while the bolt handle is raised and the bolt withdrawn. Pulling the trigger back firmly causes the trigger to tip the trigger pawl forward against the lowered trip lever to hold this lever down. The sear has no separate spring of its own and, if the sear lever is held down by continued firm pressure on the trigger, the sear will remain down of its own weight so the bolt can be removed.

Takedown and Assembly

Make sure the magazine and chamber are unloaded. To remove the bolt raise the handle and pull the bolt back about halfway. Then pull the trigger rearward and, while holding it back, withdraw the bolt.

To remove and disassemble the striker mechanism: With the bolt in the receiver and closed, raise the bolt about halfway, place the safety in the SAFE position, then remove the bolt. Being careful not to trip the safety, unscrew the bolt sleeve and firing mechanism from the bolt, then release the safety. Place the bolt sleeve on a table and, firmly grasping the mainspring at the firing pin junction, pull the spring down and slide the firing pin off the striker. Move the striker back in the bolt sleeve, turn the safety down, then pull the safety to the right out of the bolt sleeve. Shake out the small plunger and spring from the bolt sleeve. To reassemble, insert the striker rod in the bolt sleeve and, holding bolt sleeve bottom side up, drop the safety spring and plunger into their hole in the left side of the bolt sleeve. Insert the safety from right to left through the bolt sleeve and, using a small screwdriver, depress the plunger so the safety can be pushed in all the way. Compress the



Herter's U9 trigger and safety mechanism. Arrow indicates location of the trigger weight-of-pull adjustment screw.

mainspring on the striker rod so the firing pin can be repositioned on it. Insert the mechanism in the bolt and, while pushing down on the bolt sleeve, begin turning it so the threads will catch. On each revolution of the bolt sleeve, as the striker falls into the cocking cam, raise it with a screwdriver so the bolt sleeve can be screwed in another turn. Continue this until the bolt sleeve is against the bolt, stopping it so the striker head rests in the shallow notch above the cocking cam. Remove the extractor by turning it under the bolt and then move it forward. The extractor collar can then be separated and removed.

To remove the barreled action from the stock, turn out the front guard screw and remove the magazine floorplate and hinge plate. Then remove the rear guard screw, whereupon the barrel and action can be lifted from the stock. Turn out the front trigger

guard screw and the trigger guard can be removed. Reassemble in reverse order. Both guard screws will be turned up tight.

To remove the trigger mechanism, turn out the screw holding the front of the trigger housing to the receiver, then drive out the pin from the top rear of the housing and then the entire assembly can be removed. Do not disassemble the trigger mechanism unless absolutely necessary, and then only if you know what it's all about. Check the position of each part removed, laying them out in sequence so that they can be correctly reassembled.

NOTE: In listing the various BSA action parts I have named them as commonly known in the U.S., not by the names given in BSA literature. For example, the part I call a "firing pin" BSA calls the "striker." Here are some other parts with different U.S. and British names:

U.S. Name	British Name
Receiver	Body
Striker	Cocking piece
Mainspring	Striker spring
Bolt sleeve	Cocking-piece housing
Magazine floorplate	Bottom plate
Floorplate hinge plate	Bottom-plate hinge piece
Front guard screw	Front body fixing screw
Magazine box	Magazine case
Follower	Magazine platform
Follow spring	Magazine spring
Rear guard screw	Rear body fixing screw
Bolt	Bolt breech

The Majestic BSA Action

An improved BSA turnbolt action was announced late in 1959. The rifles built on this action were called the Majestic. According to Galef catalogs and the "Dope Bag" report on this rifle in the Dec., 1959 issue of *The American Rifleman*, the Majestic action was still being made at that time in the short, medium and long lengths. I am a bit skeptical about this however, and I suspect the "short" action was merely the medium action fitted

with a shorter magazine. At any rate, nowhere can I find listed the length of the short action. In my 1962 Parker-Hale catalog the Majestic Featherweight action is listed as made in "two entirely different lengths"; the medium action in calibers 270, 30-06 and 458. The long action is listed as being 7.75" long, while the medium action is 7.00" long. This would seem to indicate that the long 8.625" action was dropped in the Majestic line, and also not used later on in the Monarch line, as we shall see later on. To confuse matters, in the same Parker-Hale catalog the BSA "standard weight" rifle is listed as the Regent Model with short action in 22 Hornet and 222; as the Viscount Model with medium action in 243 and 308; and as the Imperial Model with long action in 30-06 caliber. I know that the long Royal action was 8.625" overall and here I suspect that the Imperial action was of the same length, that the medium Viscount action was 7.75" long, and the short Regent action only 7.00" long.

In any case, the 1960 improvements or changes to the action consisted of the following:

1) Bolt head, extractor and ejector: To begin with the Mauser extractor was discarded, as well as the inside collar in the receiver. Instead, the face of the barrel was counterbored for the bolt head. The bolt face is recessed for the cartridge head and the extractor built into the side of the bolt head. The extractor, sort of a C-shaped clip with a hook, slides in a groove cut part way around the bolt head. It is tensioned by a small spring-loaded plunger fitted lengthwise in the bolt. The new plunger-type is also fitted into the bolt head and held in place by a cross pin. The ejector in the trigger mechanism was thereby eliminated, but the rest of the trigger mechanism remained the same.

2) Bolt sleeve: The cocking piece is entirely within the bolt sleeve, the latter being closed so that the rear of the cocking piece is no longer visible. As small red plastic pin, positioned in a hole in the top of the bolt sleeve, becomes the cocking indicator when it projects out of the bolt sleeve when the action is cocked. The safety is positioned through the bolt sleeve as in the older Royal actions.

The rest of the action remained unchanged, although in the featherweight models the guard and floorplate were made of aluminum.

I don't find the BSA short-actioned rifle in 22 Hornet and 222 mentioned any place after about 1962. Apparently, the short action was dropped. However, the 222 was again introduced in the BSA line-up.



PART II: Commercial Rifles & Actions

The Next BSA Monarch Action

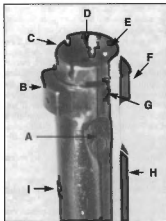
I don't know just when the next change was made, but it was probably in 1966 when the safety was omitted from the bolt sleeve and incorporated with the trigger mechanism. It then became a pivoting side safety, located on the right side of the receiver tang. This also required that the trigger mechanism be changed somewhat, which changes can be noted by examining the sectional view drawings and parts photos. Even though a safety was added to it, the Monarch trigger mechanism is much simpler than those previously used.

The final change came in 1968 when BSA began making the receiver without the integral scope mounting bases. Instead, the top of the receiver bridge and ring were made round and for screw-on scope mount bases. I suppose too many shooters complained that the dovetailed receiver limited the choice of mounts that could be used, whereas with a tapped receiver almost every scope mount maker will have bases for it.

In the Monarch action BSA attached a folded sheet-metal strip inside the floorplate, the follower spring fitting into the folds of this strip.

Monarch rifles are built on two different action lengths; one 7.00" long, the other 7.75" long. Rifles in 222, 243 and 308 have the 7.00" action, while the longer 7.75" action is used for the 270, 7mm Magnum and 30-06 calibers.

I have never seen the separate BSA-marked actions or barreled actions listed for sale, but I have been told that at one time the actions were available in Canada. Note that I said "BSA-marked" actions.



Bolt head of the BSA Monarch and Herter's U9 action, showing: (A) bolt-stop notch, (B) right (bottom) locking lug, (C) extractor, (D) bolt face recess, (E) ejector, (F) left (upper) locking lug, (G) front gas-vent hole, (H) bolt guide-rib, (I) rear gas-vent hole.

I would also like to point out here that Galef's recent advertisements for BSA rifles indicate that the BSA actions are still being fabricated in the same way today as they were when first introduced. For example, the ad says the receiver goes through sixty-two separate machine operations before it is finished, and that it is made from a solid steel billet. Another ad says the bolt is entirely machined, also going through sixty-two separate stages before it is finished. Evidently they have not yet gone to making these parts

from investment castings or using some other modern processing methods, techniques being employed today by so many firearms manufacturers.

Before leaving the BSA I must mention the locking system which BSA uses on their centerfire turnbolt actions. In the chapter on Lee-Enfields (BSA made many of these rifles), I noted the fact that the locking surfaces of the bolt and receiver are slightly angled, so that on lowering the bolt handle the bolt is cammed forward a very small amount. Conversely, after firing the rifle, the bolt becomes loose after the handle is raised only slightly. In other words, the bolt never seems to freeze in the locked position after firing. The British-designed Pattern 14 and Model 1917 Enfield actions also use a similar system though not so pronounced. The same system is used in BSA actions—the rear surface of their locking lugs is about 5 degrees off the normal 90-degree angle made with the bolt body. This angle is such that after the locking lugs first engage behind the shoulders in the receiver, as the bolt is fully closed it moves approximately .030" forward. Thus, as must be done when checking or making a headspace reading of the M1917 Enfield rifles, a true reading can only be had when the bolt is fully down. On practically all of the many other turnbolt actions described in this book, the rear locking surface on the bolt lugs are at a 90-degree angle to the bolt or very close to it.

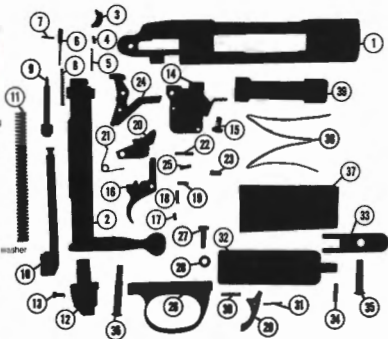
BSA Markings

All BSA rifles I've seen had the firm name stamped on the barrel, in one line, usually as follows:



Parts Legend

- 1 Receiver (top view)
- 2 Bolt
- 3 Extractor
- 4 Extractor plunger
- 5 Extractor spring
- 6 Ejector
- 7 Ejector retainer pin
- 8 Ejector spring
- 9 Firing pin
- 10 Striker rod
- 11 Main spring
- 12 Bolt sleeve
- 13 Cooking indicator & spring
- 14 Trigger housing
- 15 Trigger housing screw
- 16 Trigger
- 17 Trigger adjustment screw
- 18 Trigger spring
- 19 Trigger pivot pin
- 20 Sear/bolt-stop
- 21 Sear/bolt-stop spring
- 22 Sear/bolt-stop pin
- 23 Sear/bolt-stop bushing
- 24 Safety
- 25 Safety pivot pin
- 26 Trigger guard
- 27 Front trigger guard screw
- 28 Front trigger guard screw washer
- 29 Floorplate latch
- 30 Floorplate latch spring
- 31 Floorplate latch pin
- 32 Magazine floorplate
- 33 Floorplate hinge plate
- 34 Floorplate hinge pin
- 35 Front guard-screw
- 36 Rear guard-screw
- 37 Magazine box
- 38 Follower spring
- 39 Follower



BSA Monarch and Herter's U9

Dimensional Action Specifications

Weight (approx):	
BSA (short) .....	.36 oz.
BSA (long) .....	.38 oz.
U9 (short) .....	.39 oz.
U9 (long) .....	.41 oz.
Length:	
BSA (short)	7.00"
BSA (long)	7.75"
U9 (short)	7.75"
U9 (long)	8.50"
Receiver ring dia.	1.355"
Bolt dia. ....	.700"
Bolt travel:	
U9 (short, 222 Mag.)	3.470"
U9 (short, standard)	4.185"
U9 (long)	4.625"
Striker travel (approx.) .....	.365"
Magazine length:	
U9 (short, 222 family)	2.350"
U9 (short, 308 family)	3.125"
U9 (long)	3.350"
(BSA and Herter's U9 magazines are about the same length.)	
Bolt face recess:	
Depth .....	.140"
Dia. (222) .....	.350"
(standard) .....	.480"
(bolted mag.) .....	.540"
Guard-screw spacing:	
U9 (short)	7.125"
U9 (long)	7.675"
BSA (short)	6.375"
BSA (long)	7.125"

General Specifications

Type	Tumbolt repeater.
Receiver	One-piece machined steel. Non-slotted bridge. Pre-'68 models have integral mount bases on the receiver; later models are tapped for scope mounts.
Bolt	One-piece machined steel with dual-opposed forward locking lugs. Handle acts as safety lug.
Ignition	Striker with separate firing pin powered by a coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column box type with hinged floorplate. Five-shot capacity for standard calibers, four-shot for magnums.
Trigger	Single-stage, adjustable for weight of pull.
Safety	Pivoting side tang type, locks trigger and bolt when pulled back.
Extractor	C-clip type fitted on side of bolt head and tensioned by a spring-loaded plunger.
Bolt-stop	Sear doubles as bolt stop.
Ejector	Plunger type fitted into bolt head.

THE BIRMINGHAM SMALL ARMS CO. LTD.—ENGLAND

The BSA trademark—three stacked rifles—is stamped on the receiver. Each rifle is stamped with the usual number of British proofmarks on the receiver, bolt and breech end of the barrel. The caliber designation is usually stamped on the breech end of the barrel, and in some instances it is followed by the headspace reading. For example, 30-06—

2494. The rifles are serial numbered, the number stamped on the receiver, barrel and bolt.

Herter's U9 Action

Herter's Inc. a mail-order firm, began selling a centerpiece high-powered tumbolt action about 1965-1966 which they designated the U9 action. U9 barreled actions and complete rifles, assembled by Herter's, were also made available. In every detail the U9 action is identical to



Starting with a Herter's U9 barreled action, an amateur stockmaker completed this rifle by stocking and fitting it with a Leupold Vari-X scope in Kesseling mounts.

the BSA action (except for length) and while nowhere in the long description of this action in Herter's catalog does it mention BSA, it seems almost certain that the U9 actions were made by BSA. At least I am going to assume this to be the case until I have proof otherwise.

Besides being stamped **MADE IN ENGLAND** (in very small letters and shallowly imprinted on the side of the receiver ring), the serial number is stamped on the right lower side of the receiver ring and on the bottom of the bolt handle. British proofmarks are also stamped on these actions.

At any rate, when first introduced, Herter's U9 action was just like the BSA action being made at the same time. Beginning in 1968, when BSA actions were being made without the integral scope mount buses but with the round topped receiver tapped for scope mounts, Herter's also announced that their U9 actions would be similarly made.

At that time Herter's cataloged five different U9 actions; namely, SSK3055 for the 222, 223 and 222 Magnum cartridges; SSK3042 for such cartridges as the 22-250, 243, 6mm, 257 Roberts, 7x57 and 308; SSK3056 for the 284; SSK3043 for the 270 and 30-06; and SSK3057 for such magnums as the 264, 7mm, 300, 338 and 458.

Herter's U9 actions came in two lengths. One, 7.75" long, was used for cartridges from 222 to 308, while the other one, about 8.50" long, was used for the 270, 30-06 and the short magnums. Note that Herter's actions were longer than the BSA Monarch actions in the same calibers.

The 3055 U9 action has the shortest magazine box, just long enough for the 222 Magnum, and the magazine well is no longer than the magazine. The bolt is recessed, and the extractor made to handle the 222 head-sized cartridges. The 3042 and 3056 are alike except that the 3056 may have a slightly wider magazine well, and both are like the 3055 except for a longer magazine and a bolt head made to accept the 30-06 head-sized cartridges. The 3043 and 3057 are alike except for a different bolt head, and both are

Fitting Twist for BSA Barrels		
Caliber	Twist One Turn In	No. of Grooves
222, 22-250	14 R.H.	6
243	10 L.H.	6
6.5x55	8.66 R.H.	4
7x57	10 L.H.	5
7x64, 7mm Mag., 270, 308, 30-06, 300 Mag.	10 L.H.	5

longer than the above three actions. Other than that the things just mentioned, and the difference in weight and bolt travel, all five of the U9 actions are otherwise essentially the same.

The U9 receiver and bolt appear to be entirely machined from solid stock, as I could not find evidence of casting, welding or brazing. I assume that the bolt and receiver, as well as most of the other vital parts of this action, were made of the same quality steel used in the BSA actions.

Except for very minor differences, the U9 actions were all the same as the BSA action. This included the receiver, bolt, fire mechanism, extractor, ejector, bolt-stop, trigger mechanism and magazine parts. It is possible that many of the smaller parts would be interchangeable with the BSA parts.

Comments

I have only seen about a dozen or so of both Herter's U9 and the BSA rifles and actions but, based on this limited observation, the actions on BSA Monarch rifles were made and finished better than the U9 actions. For example, while some tool marks could be found on BSA action parts, many more were plainly visible on the U9 action. Outside BSA parts were much better finished, with much of the U9 surfaces carelessly polished on a soft polishing wheel, leaving the surfaces uneven and the edges rounded. For example, there were lathe tool marks on the rear of the bolt of the last U9 action I received, while the front of the bolt was over-polished, leaving the bolt out of round in places. The sides of the U9 trigger guard bow were only polished on a belt sander, with many grit lines plainly visible. On my U9 action the outside curved surface

of the trigger guard was well polished, and the floorplate latch left in place during the polishing, which is the correct polishing procedure. However, when the action was blued, the latch was not removed, nor were these parts properly rinsed afterwards, because the latch spring was caked nearly solid with dried bluing salts.

I also found bluing salts growing out of the barrel shoulder-receiver joint on my U9 action and, on removing the barrel, I discovered that the barrel shank was only partially threaded; the wide unthreaded section near the shoulder was filled with salts, having gotten into this area through the front trigger guard screw hole. If I had not removed the barrel and cleaned the area, those salts would have kept growing out of the joint for several years or more. Also, after removal of the barrel, I discovered that the breech face had not been polished at all—the chamber edge was not even rounded. All in all, the Herter's U9 action I received was poorly finished. Even though this action would probably function ok, and while some of the items mentioned are correctable, there is no excuse for sending out a barreled action with a sharp chamber edge and from which the bluing salts have not been washed.

Takedown and Assembly

BSA Monarch and Herter's U9 rifles and actions are disassembled/assembled just like the BSA Royal action as described previously except for the following:

To remove the bolt, raise the bolt handle and pull the bolt about halfway back, press forward very hard on the trigger and, while holding this pressure, pull the bolt out.

Because of the very stiff mainspring, the firing mechanism is quite difficult to remove and replace in the bolt. To remove the mechanism the bolt sleeve must be turned counterclockwise out of the bolt. In doing this the striker must be lifted out of the cocking notch in the bolt on every turn of the bolt sleeve until the sleeve is free of the bolt. To disassemble the firing mechanism it is helpful to place a small piece of wood in the open space in the bottom of the bolt sleeve to hold the striker forward. Then, while resting the bolt sleeve on a table and pulling



The North American-style BSA CF2 Sporter. The comb of the stock is low enough to permit sighting with the open sight.

down on the front of the mainspring, the firing pin can be slipped off. The mainspring can then be removed, the striker tipped in the bolt sleeve and pulled out backward. Reassemble in reverse order, again using the piece of wood to hold the striker forward in the bolt sleeve. In turning the firing mechanism back into the bolt sleeve a small C-clamp can be used to hold the striker back in the bolt sleeve so that the bolt sleeve is easily started.

The extractor can be removed by depressing the extractor plunger with the point of a pen knife and slipping the extractor away from the bolt. To remove the ejector, drive out the ejector pin by inserting a small drift punch into the hole through the right locking lug.

After the trigger mechanism is removed from the receiver, it can be disassembled as follows: Drive out the safety pivot pin and remove the safety and sear/trigger spring. Drive out the trigger pin and remove trigger and trigger-adjustment spring. Drive out the sear bushing and lift out the sear. Reassemble in reverse order.

Sometime during the late '70s or early '80s Herter's went out of business and several different turnbolt rifles they sold were orphaned.

Later BSA Models

As has happened with several other imported rifles, finding a permanent outlet for them in the U.S. has been difficult. The BSA is a good example of this. I believe the Galef firm carried the BSA rifles the longest.

I believe the line was then taken over by another firm in New York called Precision Sports. The firm cataloged the following models:

North American Model CF2 Sporter—This rifle is called the North American Model because it was stocked in the style favored by many American rifle buyers. It was a full-sized stock in all its dimensions—a he-man's stock. It was fitted with a thick recoil pad, quick detachable sling swivels, flared pistol grip cap made of rosewood with a white diamond inlaid into it, and a rosewood forend tip. White spacers set off the recoil pad, grip cap and forend tip. The forend was flat bottomed and semi-beavertail in shape. The pistol grip fitted a large hand and sported a Wundhammer swell on its right side. Both sides of the pistol grip and the forend were checkered. The large and rather thick cheekpiece slopes toward the front and was combined with a Monte Carlo and roll-over comb, with the comb low enough so the open sights on the barrel could be used. Those sights were a Williams Guide rear sight and a bead front mounted on a Williams ramp. The 24" barrel was of standard sporter weight and contour. There were two versions of this rifle; the standard caliber model and the Magnum caliber. Standard calibers were 222, 22-250, 243, 6.5x55, 7x57, 7x64, 270, 308 and 30-06. Magnum calibers are 7mm Rem. and 800 Magnum. The rifle weighed about 8.5 pounds.

European Style CF2 Sporter—This rifle had the same action and barrel, and was made in the same calibers, as the North American style BSA Sporter described above. The difference was in the stock alone. The stock on this rifle was trimmed to slimmer lines than the North American style with the white line spacers omitted. Checkering was plain rather

than coarse skip-line, plus the cheekpiece had no roll-over and the pistol grip was slimmer yet retained the Wundhammer swell. The stock could be had with either a high-gloss polyurethane finish or a dull oil finish. This rifle weighed slightly less than the North American-style sporter, and although the stock was described as "European" in style, it was not nearly so European as the stock on the former BSA Royal and Majestic rifles shown.

BSA CF2 Stutzen Sporter—The Stutzen was BSA's short barreled, full stocked carbine hunting rifle. Most American riflemen would call it a Mannlicher-stocked rifle or a Mannlicher styled rifle with its short 20.5" barrel and a forend that extends to the muzzle. It was Mannlicher in another way too, in that it was also available with a double set trigger mechanism of BSA design. This rifle had a contrasting wood forend tip and pistol grip cap, a slim pistol grip with Wundhammer swell, open sights and quick detachable sling swivels. It weighed about 7.5 pounds and was available in calibers 222, 6.5x 55, 308 and 30-06, and, on special order, in some other standard calibers. Fine checkering and an oil finish was standard. All of these models of the BSA centerfire rifles were fitted with recoil pads. All models also had the receiver drilled and tapped for scope mounts and the barrels of the sporters tapped for Williams open sights.

BSA CF2 Heavy Barrel Varmint Rifle—This rifle was nothing more than the BSA CF2 North American-style but fitted with a 4.5-pound heavy barrel. Barrel length was 23.6" and the rifle weighed about 10.5 pounds without scope. Available only in calibers 222, 22-250 and 243. With standard or double-set trigger, it made an excellent varmint rifle.

BSA CF2 Action

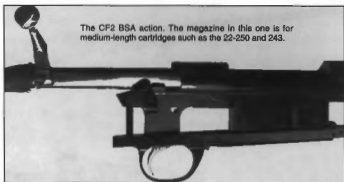
In the first part of this chapter, I described the various centerfire turnbolt actions that the BSA firm made up until 1968. We saw the

PART II: Commercial Rifles & Actions

change made from the long Mauser-type non-rotating extractor to a small one built in the bolt head; the safety changed from the bolt sleeve to the trigger mechanism; a change in the ejector, etc. Beginning in about 1968, the round-topped receiver with scope mounting holes were becoming standard to replace the integral dovetail bases. I have already described the new line of BSA rifles above and now I want to describe the new CF2 action that has developed after 1968. I used the word "new" in describing these rifles and actions and that may be misleading because, to the best of my knowledge, they are no longer new.

The "new" CF2 action is basically the same as the Monarch action of the pre-'68 period. There have been changes and improvements made in the action and I will point them out later on, but one thing has not changed and that is the way they were manufactured. The receiver was still being made by machining it from a solid billet of steel—milled, bored, shaped, drilled, threaded and polished in about the same way as the first BSA turnbolt action was made.

The bolt was also being made in that same way, the old-fashioned slow way, by machining it. Their action has not been cheapened by going to a faster and cheaper way of making these two major parts. They have not changed the basic design of the action either; such features as the dual opposed locking lugs on the front of the bolt, the bolt-stop and trigger mechanism or the magazine remain the same. What they did change has general-



The CF2 BSA action. The magazine in this one is for medium-length cartridges such as the 22-250 and 243.

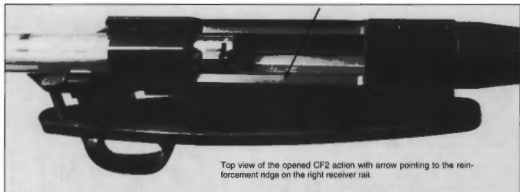
ly been for the better. If you are not familiar with the BSA Monarch action which preceded the CF2, then reread the early part of this chapter.

A very noticeable feature which is found on the CF2 action but not on earlier BSA actions, except on the 1968 transitional model, was the bolt guide rib. It was a rib of steel that fits against and nearly the full length of the bolt and along the right side of the ejection port of the receiver. It was held in place by a collar that lies in a groove in the bolt, and was similar to the extractor collar on the M98 Mauser with lips that engage in a slot in the rib. This rib does not rotate with the bolt and when the bolt is rotated to its full unlocked position, it lies between the

root of the bolt handle and the right locking lug. In this position it moved with the bolt as it is opened and closed, sliding in the locking lug raceway in the receiver bridge and in this manner it helps guide the bolt and prevents possible binding. When the bolt is closed, the front end of the guide rib fills the gap on the locking lug raceway in the receiver ring and thus serves to prevent foreign matter getting into this area. The arrangement was very similar to the guide rib in the Sako actions, except that on the long Sako actions the rib is fastened to the bolt with two collars instead of one. Not an absolute necessity, this rib is a worthwhile feature for the smoothest operation of the action.



The CF2 action, opened. The action was the same length for all calibers from 222 to 300 Magnum; only the magazine lengths and bolt travel are different. The arrow points to the location of the socket-head screw that adjusts weight of trigger pull. Turning it counterclockwise tightens the pull.



Top view of the opened CF2 action with arrow pointing to the reinforcement ridge on the right receiver rail.

Now study the exploded-view drawing of the CF2 action and compare it, as well as the parts legend, with the one shown for the BSA Monarch and Herter's U9 action. You will note a number of changes, one of which is the bolt guide rib and its other parts. It is not included in the Monarch drawing but should have been as this feature was already in use in 1968. Look closely and you will notice some changes made to the receiver, bolt sleeve, trigger mechanism, trigger guard, floorplate latch and other parts. In the CF2 action, the front trigger guard screw was omitted and the trigger guard and magazine plate made as one piece. I consider every change made as an improvement, both in the functioning and operation of the action, as well as in the appearance of it. These changes and improvements were probably not all made and adopted at once, it probably was an on-going process.

In addition to the BSA rifles just described, BSA barreled actions in many calibers and BSA actions were also available from the importer.

Markings

The BSA CF2 rifle I bought is marked as follows. On the top center of the barrel is stamped:

B.S.A. GUNS LTD. ENGLAND

The BSA trademark of three stacked rifles and the letters BSA are also on the top center of the barrel. The caliber is stamped of the left side of the barrel breech. On the left side of the receiver is:

GENERAL SPORTING GOODS, ITHACA, N.Y.

The serial number is stamped on the right side of the receiver and just above it is:

MADE IN ENGLAND

The serial number is also stamped below the bolt handle. British proofmarks are stamped on the breech end of the barrel, receiver ring, and on the bolt handle.

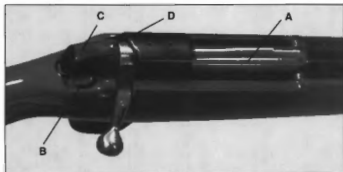
Comments

Now for a few comments about the action. The face of the barrel is recessed and the bolt

head fits into it, exactly as the Model 700 Remington is made. I like this. The extractor is on the small side and it slides in a slot cut into the rim of the bolt face recess as in the Browning BBR rifle. Of the two, the BSA extractor seems to be sturdier. In the Browning, the extractor is held under tension by a tiny piece of spring wire, while in the BSA a spring-backed plunger activates the extractor as in the post-'64 Model 70 Winchester and Savage 110C. I like the BSA extractor and bolt head arrangement best. I would also prefer the BSA extractor over the one in the Remington M700 series and Model 788. However, for a big game hunting rifle I would prefer the older Mauser-type extractor that BSA once used, and that Winchester once used in their Model 70 and are using again in the same model, and Remington in the Models 30 and 720, an extractor that prevents double loading. In addition to serving as an extractor, and a very strong one at that, it also served as a bolt guide and as such probably was a better bolt guide than the one on the BSA. The concern about double loading seems to be a thing of the past and almost all centerfire rimbolt rifle manufacturers are making the bolts with simpler and smaller extractors and plunger-type ejectors with which double loading is possible.

The BSA safety is noiseless, but it seems a bit on the puny order to me. The CF2 is also one of very few rifles in which the trigger can be adjusted without removing the stock. I was able to adjust the weight of pull on my CF2 rifle to only two pounds.

There are other features of this action worth mentioning. The magazine box is well made, and the round ridges pressed into each side of it to hold the cartridges from sliding forward from the recoil of the rifle are such that they will do just this. BSA has also reinforced the right receiver rail by leaving a ridge of extra metal on it between the receiver ring and bridge. Amateur gunsmiths and stockers will like the oval sides and large rounded ends of



Top view of the CF2 action showing: (A) bolt guide rib, (B) safety, (C) enclosed bolt sleeve and (D) cocking indicator.



BSA CF2 Stutzen Sporter rifle.

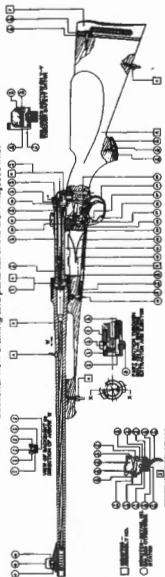
the trigger guard assembly because it is easier to inlet into a stock. Shooters will like the enclosed bolt sleeve and its graceful shape.

At the time I ordered a BSA CF2 rifle the importer had only one on hand to ship promptly and that was the North American-style. I was very disappointed when I first held it in my hands and shouldered it. It was the stock I disliked and the more I looked at it, the more I disliked it. I thought it ugly and crude. Why anyone would want a rollover cheekpiece is beyond my understanding. And whoever shaped that stock did a poor job of it. After I had examined the action and finished my write up about it and photographed it, I traded it off to a gun dealer. I figured that he would have a hard time selling it. About a week later he called me up and told me this story: "Two young men came to my shop and when they spotted this BSA rifle that you so disliked, one of them exclaimed, 'Just what I wanted.' Believe it or not they liked everything about it especially so the roll-over cheekpiece. Well I sold it to them and you never saw two happier fellows." That just goes to show you that taste in rifle stocks differ widely.

At the time I wrote about the BSA CF2 action, it was still being made and imported. Although it might still be made, I can find no information since 1992 that it is being imported in the U.S. I wrote about it in the present tense, and if it is true that no one is importing it, I should have used the past tense. A gun writer very often encounters this situation.

Also with so many different BSA models made and different designations used such as Majestic, Royal and etc. gun writers like myself find it difficult to separate them. In writing about them I sought and received information from the manufacturer in England and from the major and minor importers about them. Using this information, I did my dead level best to give these various models their correct names and descriptions. But now and then I have been challenged by others that some of this information is incorrect. I found out that even the manufacturers aren't sure if whether I am wrong or right. However, I did my best.

Sectional view drawing and parts list of the BSA Majestic rifle.



CODE A		CODE B		CODE C		CODE D		CODE E		CODE F		CODE G		CODE H		CODE I		CODE J		CODE K		CODE L		CODE M		CODE N		CODE O		CODE P		CODE Q		CODE R		CODE S		CODE T		CODE U		CODE V		CODE W		CODE X		CODE Y		CODE Z		CODE AA		CODE AB		CODE AC		CODE AD		CODE AE		CODE AF		CODE AG		CODE AH		CODE AI		CODE AJ		CODE AK		CODE AL		CODE AM		CODE AN		CODE AO		CODE AP		CODE AQ		CODE AR		CODE AS		CODE AT		CODE AU		CODE AV		CODE AW		CODE AX		CODE AY		CODE AZ		CODE BA		CODE BB		CODE BC		CODE BD		CODE BE		CODE BF		CODE BG		CODE BH		CODE BI		CODE BJ		CODE BK		CODE BL		CODE BM		CODE BN		CODE BO		CODE BP		CODE BQ		CODE BR		CODE BS		CODE BT		CODE BU		CODE BV		CODE BW		CODE BX		CODE BY		CODE BZ		CODE CA		CODE CB		CODE CC		CODE CD		CODE CE		CODE CF		CODE CG		CODE CH		CODE CI		CODE CJ		CODE CK		CODE CL		CODE CM		CODE CN		CODE CO		CODE CP		CODE CQ		CODE CR		CODE CS		CODE CT		CODE CU		CODE CV		CODE CW		CODE CX		CODE CY		CODE CZ		CODE DA		CODE DB		CODE DC		CODE DD		CODE DE		CODE DF		CODE DG		CODE DH		CODE DI		CODE DJ		CODE DK		CODE DL		CODE DM		CODE DN		CODE DO		CODE DP		CODE DQ		CODE DR		CODE DS		CODE DT		CODE DU		CODE DV		CODE DW		CODE DX		CODE DY		CODE DZ		CODE EA		CODE EB		CODE EC		CODE ED		CODE EE		CODE EF		CODE EG		CODE EH		CODE EI		CODE EJ		CODE EK		CODE EL		CODE EM		CODE EN		CODE EO		CODE EP		CODE EQ		CODE ER		CODE ES		CODE ET		CODE EU		CODE EV		CODE EW		CODE EX		CODE EY		CODE EZ		CODE FA		CODE FB		CODE FC		CODE FD		CODE FE		CODE FF		CODE FG		CODE FH		CODE FI		CODE FJ		CODE FK		CODE FL		CODE FM		CODE FN		CODE FO		CODE FP		CODE FQ		CODE FR		CODE FS		CODE FT		CODE FU		CODE FV		CODE FW		CODE FX		CODE FY		CODE FZ		CODE GA		CODE GB		CODE GC		CODE GD		CODE GE		CODE GF		CODE GG		CODE GH		CODE GI		CODE GJ		CODE GK		CODE GL		CODE GM		CODE GN		CODE GO		CODE GP		CODE GQ		CODE GR		CODE GS		CODE GT		CODE GU		CODE GV		CODE GW		CODE GX		CODE GY		CODE GZ		CODE HA		CODE HB		CODE HC		CODE HD		CODE HE		CODE HF		CODE HG		CODE HH		CODE HI		CODE HJ		CODE HK		CODE HL		CODE HM		CODE HN		CODE HO		CODE HP		CODE HQ		CODE HR		CODE HS		CODE HT		CODE HU		CODE HV		CODE HW		CODE HX		CODE HY		CODE HZ		CODE IA		CODE IB		CODE IC		CODE ID		CODE IE		CODE IF		CODE IG		CODE IH		CODE II		CODE IJ		CODE IK		CODE IL		CODE IM		CODE IN		CODE IO		CODE IP		CODE IQ		CODE IR		CODE IS		CODE IT		CODE IU		CODE IV		CODE IW		CODE IX		CODE IY		CODE IZ		CODE JA		CODE JB		CODE JC		CODE JD		CODE JE		CODE JF		CODE JG		CODE JH		CODE JI		CODE JJ		CODE JK		CODE JL		CODE JM		CODE JN		CODE JO		CODE JP		CODE JQ		CODE JR		CODE JS		CODE JT		CODE JU		CODE JV		CODE JW		CODE JX		CODE JY		CODE JZ		CODE KA		CODE KB		CODE KC		CODE KD		CODE KE		CODE KF		CODE KG		CODE KH		CODE KI		CODE KJ		CODE KL		CODE KM		CODE KN		CODE KO		CODE KP		CODE KQ		CODE KR		CODE KS		CODE KT		CODE KU		CODE KV		CODE KW		CODE KX		CODE KY		CODE KZ		CODE LA		CODE LB		CODE LC		CODE LD		CODE LE		CODE LF		CODE LG		CODE LH		CODE LI		CODE LJ		CODE LK		CODE LM		CODE LN		CODE LO		CODE LP		CODE LQ		CODE LR		CODE LS		CODE LT		CODE LU		CODE LV		CODE LW		CODE LX		CODE LY		CODE LZ		CODE MA		CODE MB		CODE MC		CODE MD		CODE ME		CODE MF		CODE MG		CODE MH		CODE MI		CODE MJ		CODE MK		CODE ML		CODE MM		CODE MN		CODE MO		CODE MP		CODE MQ		CODE MR		CODE MS		CODE MT		CODE MU		CODE MV		CODE MW		CODE MX		CODE MY		CODE MZ		CODE NA		CODE NB		CODE NC		CODE ND		CODE NE		CODE NF		CODE NG		CODE NH		CODE NI		CODE NJ		CODE NK		CODE NL		CODE NM		CODE NN		CODE NO		CODE NP		CODE NQ		CODE NR		CODE NS		CODE NT		CODE NU		CODE NV		CODE NW		CODE NX		CODE NY		CODE NZ		CODE OA		CODE OB		CODE OC		CODE OD		CODE OE		CODE OF		CODE OG		CODE OH		CODE OI		CODE OJ		CODE OK		CODE OL		CODE OM		CODE ON		CODE OO		CODE OP		CODE OQ		CODE OR		CODE OS		CODE OT		CODE OU		CODE OV		CODE OW		CODE OX		CODE OY		CODE OZ		CODE PA		CODE PB		CODE PC		CODE PD		CODE PE		CODE PF		CODE PG		CODE PH		CODE PI		CODE PJ		CODE PK		CODE PL		CODE PM		CODE PN		CODE PO		CODE PP		CODE PQ		CODE PR		CODE PS		CODE PT		CODE PU		CODE PV		CODE PW		CODE PX		CODE PY		CODE PZ		CODE QA		CODE QB		CODE QC		CODE QD		CODE QE		CODE QF		CODE QG		CODE QH		CODE QI		CODE QJ		CODE QK		CODE QL		CODE QM		CODE QN		CODE QO		CODE QP		CODE QQ		CODE QR		CODE QS		CODE QT		CODE QU		CODE QV		CODE QW		CODE QX		CODE QY		CODE QZ		CODE RA		CODE RB		CODE RC		CODE RD		CODE RE		CODE RF		CODE RG		CODE RH		CODE RI		CODE RJ		CODE RK		CODE RL		CODE RM		CODE RN		CODE RO		CODE RP		CODE RQ		CODE RR		CODE RS		CODE RT		CODE RU		CODE RV		CODE RW		CODE RX		CODE RY		CODE RZ		CODE SA		CODE SB		CODE SC		CODE SD		CODE SE		CODE SF		CODE SG		CODE SH		CODE SI		CODE SJ		CODE SK		CODE SL		CODE SM		CODE SN		CODE SO		CODE SP		CODE SQ		CODE SR		CODE SS		CODE ST		CODE SU		CODE SV		CODE SW		CODE SX		CODE SY		CODE SZ		CODE TA		CODE TB		CODE TC		CODE TD		CODE TE		CODE TF		CODE TG		CODE TH		CODE TI		CODE TJ		CODE TK		CODE TL		CODE TM		CODE TN		CODE TO		CODE TP		CODE TQ		CODE TR		CODE TS		CODE TT		CODE TU		CODE TV		CODE TW		CODE TX		CODE TY		CODE TZ		CODE UA		CODE UB		CODE UC		CODE UD		CODE UE		CODE UF		CODE UG		CODE UH		CODE UI		CODE UJ		CODE UK		CODE UL		CODE UM		CODE UN		CODE UO		CODE UP		CODE UQ		CODE UR		CODE US		CODE UT		CODE UY		CODE UZ		CODE VA		CODE VB		CODE VC		CODE VD		CODE VE		CODE VF		CODE VG		CODE VH		CODE VI		CODE VJ		CODE VK		CODE VL		CODE VM		CODE VN		CODE VO		CODE VP		CODE VQ		CODE VR		CODE VS		CODE VT		CODE VU		CODE VV		CODE VW		CODE VX		CODE VY		CODE VZ		CODE WA		CODE WB		CODE WC		CODE WD		CODE WE		CODE WF		CODE WG		CODE WH		CODE WI		CODE WJ		CODE WK		CODE WL		CODE WM		CODE WN		CODE WO		CODE WP		CODE WQ		CODE WR		CODE WS		CODE WT		CODE WU		CODE WV		CODE WW		CODE WX		CODE WY		CODE WZ		CODE XA		CODE XB		CODE XC		CODE XD		CODE XE		CODE XF		CODE XG		CODE XH		CODE XI		CODE XJ		CODE XK		CODE XL		CODE XM		CODE XN		CODE XO		CODE XP		CODE XQ		CODE XR		CODE XS		CODE XT		CODE XU		CODE XV		CODE XW		CODE XX		CODE XY		CODE XZ		CODE YA		CODE YB		CODE YC		CODE YD		CODE YE		CODE YF		CODE YG		CODE YH		CODE YI		CODE YJ		CODE YK		CODE YL		CODE YM		CODE YN		CODE YO		CODE YP		CODE YQ		CODE YR		CODE YS		CODE YT		CODE YU		CODE YV		CODE YW		CODE YX		CODE YY		CODE YZ		CODE ZA		CODE ZB		CODE ZC		CODE ZD		CODE ZE		CODE ZF		CODE ZG		CODE ZH		CODE ZI		CODE ZJ		CODE ZK		CODE ZL		CODE ZM		CODE ZN		CODE ZO		CODE ZP		CODE ZQ		CODE ZR		CODE ZS		CODE ZT		CODE ZU		CODE ZV		CODE ZW		CODE ZX		CODE ZY		CODE ZZ	
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Champlin Firearms, Inc.

AN ESTABLISHED FIRM in the field of custom-built sporting rifles is Champlin Firearms Inc. of Enid, Oklahoma. They build their fine rifles on a remarkable turnbolt action produced almost entirely in their shop. This action was developed under a patent obtained by Jerry Haskins (3,494,216, dated June 17, 1969), which covers the combination rear safety-lug and bolt-guide system—a feature which probably makes this action the strongest and smoothest working sporting rifle action made.

The Champlin rifle illustrated is a typical example of the custom-built rifles turned out by Champlin Firearms Inc. It is stocked in the time-honored classic sporting stock pattern. Strictly made to order, these rifles can be made for most of the large rimless or belted centerfire cartridges, including the very large Weatherby 378 and 460 Magnums. The actions are made only in one length, and right- or left-handed versions.

The Action

At the beginning the receiver and bolt of this very large and strong all-steel action were machined from 4140 steel bar stock. The receiver was heat-treated to 37 Rockwell on the C scale, the bolt to 45-C. Some years later Champlin began making the major parts of their action such as the receiver and bolt by the investment casting process with SAE 4140 steel. All parts are made of a type of steel best suited to its purpose, and properly heat treated as required for maximum strength, durability and wear prevention.

The receiver is large and massive. It has a flat bottom, flat sides, and is octagonal in shape on top. It is 9.00" long, 1.265" wide and 1.285" deep, not including the integral recoil lug under the receiver ring, which is .375" deep. Since these receivers were finished one at a time, the above measurements, and other specifications, may vary somewhat. The receiver ring is about 1.70" long, the bridge about

1.60" long, with a loading port in between about 3.40" long. Two holes each are tapped in the top of the bridge and ring for scope mount bases. The receiver ends with a nicely tapered tang, but it is almost entirely covered by the bolt sleeve; only the extreme rear shows when the bolt is closed.

The bolt, also massive, is slightly over 6.00" long, its major diameter .850".

To more clearly understand my description of the locking system of the Champlin action, the reader should study the illustrations of the bolt. The full bolt diameter is turned down to leave three locking lugs on its extreme forward end, each about .415" wide and .530" long. About 1/2-inch to the rear of each of these lugs are three equally wide ridges which, as covered by the Haskins patent, provide three safety locking lugs, which also function as guide ribs. The inside of the receiver has three grooves which accept the ribbed bolt. When the bolt handle is turned down, the three front lugs engage shoulders in the receiver ring, while the three guide ribs engage in front of, but do not contact, shoulders in front of the bridge. The bottom guide rib, however, is grooved for the bolt-stop, and it presents only a small area of possible contact with the receiver, thus there are really only two safety lugs at work. The front locking lug system, in fact, is more than adequately strong to hold the bolt in the receiver against the back thrust of any cartridge for which the rifle might be chambered; the safety lugs give an added margin of safety. The bolt is so well secured in the receiver that it would be impossible to drive it back.

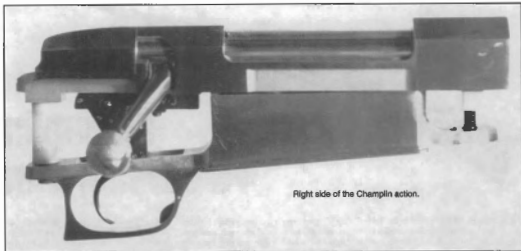
The 3.485" long bolt ribs also guide the bolt in the receiver when it is operated, which is their primary function. This function can best be described by comparing the Champlin action with a couple of others in which a small bolt-stop acts as the bolt guide, namely, the Ranger and the Weatherby Mark V. In

both of these actions the round plunger-type bolt-stop provides the only bolt guide that prevents the bolt from turning in the receiver. The Champlin action has a similar bolt-stop, but it functions only to stop the bolt. The Champlin guide ribs steady the bolt better than the bolt-stop alone could ever do. The ribs also prevent the bolt from binding regardless of how, or from what position, the action is operated, with the result that the Champlin action is smooth and easy to operate. Because of the triple locking-lug arrangement, only about a 60-degree bolt rotation is required to lock or unlock the Champlin bolt.

The barrel face is flat, as is the bolt face, which nearly contacts it when the bolt is closed. The bolt face is deeply recessed for the cartridge head so that the chambered cartridge is all but completely enclosed. The bolt is so large in diameter that there's a thick rim of metal around the recess, which adequately supports the cartridge head and rim. The spring-loaded plunger-type ejector projects from the recessed bolt face, held in place by a cross pin. The sliding type extractor occupies a mortise cut into the front face of the right locking lug, held in place and tensioned by a coil spring and plunger. The inside edge of the extractor is well beveled, letting it move easily over the rim of a cartridge in the chamber. The extractor is wide enough so that it will not pull through the rim of a cartridge that tends to stick in the chamber. This extractor is not unlike that in the new post-'64 Model 70 Winchester and Model 110-C Savage actions.

The bolt handle, attached to the heavy rear part of the bolt, has a tapered stem which angles slightly rearward and ends in a round ball. The top of the ball is neatly and finely

(Above) Custom-made Champlin rifle stocked in classic form.



Right side of the Champlin action.

checked for better grasping. The bolt handle is low enough to clear the eyepiece of the lowest-mounted scope. The rear side of the bridge is deeply notched for the base of the bolt handle. Although this action certainly does not need another safety lug, the bolt handle could serve this function.

The top of the notch into which the base of the bolt handle fits is sloped slightly rearward; on raising the bolt handle, it contacts this surface and the bolt is cammed back to provide the initial power to the extractor. Each of the three locking lugs have their approaching corners cut off so that the bolt is forced forward on the final closing.

The bolt is drilled from the rear to accept the firing mechanism, which is composed chiefly of the one-piece firing pin, coil mainspring, cocking piece and bolt sleeve. The firing pin is threaded into the cocking piece and prevented from turning by a half-moon wedge

of metal fitted in a notch cut into the stem of the bolt sleeve, which is in turn threaded into the bolt. This method of keeping the firing pin from turning is better than using a set-screw, as in the Sako and some other actions, since set-screws can work loose. The mainspring is compressed over the firing pin between the bolt-sleeve stem and a C-shaped collar on the front part of the firing pin. The action cocks on lifting the bolt handle, a cam on the rear of the bolt forcing the cocking piece back. The entire firing mechanism and bolt sleeve are prevented from turning when the bolt is opened by the nose of the cocking piece resting in a shallow notch at the rear of the bolt.

The bolt sleeve (called a shroud by the Champlin people) deserves special mention. It is quite large, and octagonal in shape to match the receiver bridge, against which it fits when the action is closed. From the bridge the bolt sleeve tapers gently back to match exactly the

contour of the receiver tang, against which the bottom of the bolt sleeve fits closely. It is entirely closed at the rear; only its bottom is open to allow the removal of the cocking piece. The front of the bolt sleeve is slightly recessed to fit over the rear end of the bolt. All of this provides maximum protection in the event powder gases should get into the bolt body.

If powder gases should enter the bolt through the firing pin tip hole, there is an adequate oblong hole in the bolt body bottom, about 2" behind the bolt face, to allow the gases to be directed into the magazine well. Consequently, there are no vent holes exposed on the outside of the action into which dirt or other foreign material can enter.

As previously mentioned, the bolt-stop is a round plunger, made as part of the trigger mechanism. It projects upward through a hole in the front part of the trigger housing, through a hole in the bottom of the receiver and into



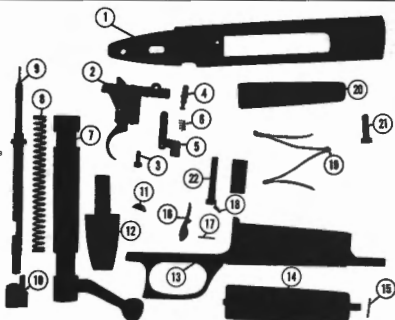
Right side of the Champlin action, open.

Parts Legend

- 1 Receiver (top view)
- 2 Carrier single-stage trigger mechanism
- 3 Trigger screw
- 4 Bolt-stop
- 5 Bolt-stop release lever
- 6 Bolt-stop spring
- 7 Bolt
- 8 Mainpring
- 9 Firing pin
- 10 Cooking piece
- 11 Firing-pin lock
- 12 Bolt sleeve
- 13 Trigger guard/magazine
- 14 Magazine floorplate
- 15 Floorplate hinge pin
- 16 Floorplate latch
- 17 Floorplate latch pin
- 18 Floorplate latch spring
- 19 Follower spring
- 20 Follower
- 21 Front guard screw
- 22 Rear guard screw

Not shown:

- Extractor
- Extractor plunger
- Extractor spring
- Ejector
- Ejector spring
- Ejector retainer pin



Dimensional Action Specifications

Weight	52 oz.
Length	9.00"
Receiver width	1.265"
Bolt dia.	
(major dia.)	.880"
(body dia.)	.671"
Bolt travel	4.575"
Striker travel	.295"
Bolt face recess:	
Depth	.135"
Magazine length	3.675"
Magazine-well width	.550"
Guard-screw spacing	7.812"

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece, 4140 steel. Integral recoil lug, non-slotted bridge. Tapped for top scope mounts.
Bolt	One-piece steel bolt with three forward locking lugs. Low profile bolt handle. Three guide ribs on bolt also function as safety lugs.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column five-shot box-type with hinged floorplate. Four-shot for most magnum calibers.
Trigger	Fully adjustable single-stage type (Carrier).
Safety	Sliding tang-type connected to the trigger mechanism. Rotary type at right side of bolt sleeve, locks striker and bolt when tipped back is optional.
Extractor	Sliding-type mortised into face of one locking lug.
Ejector	Plunger type in bolt face.
Bolt-stop	Plunger-type fitted into trigger housing and bottom of the receiver; engages bottom groove in the bolt body.

the bolt raceway. The bottom rib of the bolt is grooved for the end of the bolt-stop, and the bolt is halted in its rearward travel when the bolt-stop contacts the end of this groove. The bolt-stop is ample in diameter and hardened, so there is little chance of it being damaged or sheared off when the bolt is opened smartly. It is held up by a small coil spring and can be lowered, to remove the bolt, by a lever which is attached to the left side of the trigger housing. The knurled knob of this lever lies alongside the receiver tang just above the stock line, where it is unobtrusive and convenient to use.

Of the several makes of actions which have similar bolt-stops, I believe the method Champlin uses to depress it for bolt removal is the

best. It is entirely independent of the trigger, therefore nothing has to be sacrificed in the trigger mechanism because of it.

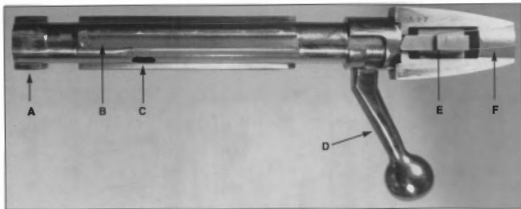
The one-piece trigger guard/magazine box is of all steel construction. It is heavily constructed throughout, with thick and smooth walls. In fact, it is not much different from the trigger guard/magazine of the Brexev Magnum Mauser action described in another chapter. The heavy floorplate, hinged to the front tang of the unit, is held closed by a latch fitted in the front of the trigger guard bow. The bottom of the steel follower and the

inside of the floorplate are grooved for the ends of the W-shaped follower spring, which holds these three parts together. The front and rear ends of the guard are octagonal in shape to complement the top shape of the receiver. The floorplate also has beveled edges to continue the octagonal configuration.

The Champlin may be had with a square-backed guard bow, a distinctive feature, or a conventional rounded bow can be ordered. The bow is made narrower from front to back, and the effect is quite pleasing.

The magazine-well opening is milled to

PART II: Commercial Rifles & Actions



Underside of the Champlin bolt showing: (A) bolt head with its triple locking lugs, (B) bolt-stop groove in one of the bolt-guide ribs, (C) gas-vent hole, (D) bolt handle, (E) cocking piece, (F) enclosed bolt sleeve.

leave integral cartridge-guide lips on each side to hold the staggered column of cartridges in the magazine, and to guide each one into the chamber when pushed there by the bolt. The smooth inside surfaces of the well let cartridges feed smoothly into the chamber. Made to handle the longest magnum cartridges, Champlin can block off the rear part of the magazine if the customer wants the rifle chambered for a shorter cartridge.

Two Allen-head guard screws passing through each end of the guard and threading into the bottom of the recoil lug and receiver tang, securely hold the barrel and action in the stock.

Champlin uses the very fine Canjar single-stage trigger for their action. This mechanism, with its attached bolt-stop, is fastened to the bottom of the receiver by an Allen-head screw and tightened by a setscrew. The trigger is fully adjustable for weight-of-pull, take-up and over-travel. Because the trigger is a Canjar, I assume that Canjar also furnishes a single-set mechanism to replace the trigger itself.

Champlin once furnished more than one type of safety. The first one was a pivoting type built into the right side of the bolt sleeve. When tipped back, it locked both striker and bolt. The second is a sliding tang type built into an extension of the receiver tang; when it is slid back it locks the trigger mechanism. The sliding tang safety has become the standard safety.

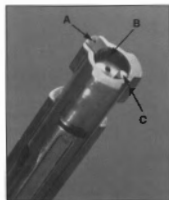
In time as more actions were made and used some minor improvements have been added including the Canjar trigger, bolt-stop, firing pin, etc.

Comments

This is an extremely rugged and strong action, very well made and finished. No

other sporting turnbolt action has a stronger or more rigid receiver or a stronger locking system. It is a large and heavy action, and so-made that it will handle the largest magnum cartridge that anyone would want to fire in a shoulder arm. Yet it is not so large and bulky that it looks out of place on a trim sporting rifle. It is an action that will stand up under hard usage with powerful cartridges. Neat and trim in outline, all parts are well fitted, making it easy and smooth to operate. Lock time is very fast and ignition is positive.

There are other things I like about this



Champlin bolt head showing: (A) extractor, (B) bolt-face recess, (C) ejector. This photo also shows the triple forward locking lugs and the front of the triple bolt-guide ribs, which also serve as safety lugs.

action, such as the octagon shape of the receiver and bolt sleeve, the enclosed or shrouded bolt sleeve and the use of the Canjar trigger.

The Champlin action, however, is not one to choose for making a rifle in one of the many standard calibers, and especially not if you want a lightweight rifle. It is a most ideal action for building a medium- to heavy-weight rifle in one of the belted magnum cartridges, and especially so for one of the long magnum calibers. For example, if you want an easy working, rugged action on which to build a rifle for hunting the largest and most dangerous African game, in such calibers as the 375 H&H Magnum or 460 Weatherby Magnum, then I can recommend this action. On the other hand, if you want a custom-made rifle just for show, then the Champlin action, with its octagon-shaped receiver, is as showy as any other action, with or without engraving.

In our affluent society, some people are actually buying firearms that are unusual, expensive, custom made, or whatever, just for the sake of owning something different to show off and talk about. Whether the Champlin rifle will be used or not, anyone owning one will certainly want to exhibit it.

One last comment. Because of the bolt design, with its three guide ribs, there are two openings between the bolt and the rear of the receiver ring. In the rare event of a case head rupture much powder gas could enter the locking-lug ways and be directed toward the shooter's face. While there's little likelihood of this ever happening, if I were to build a rifle on this action I'd want a $\frac{1}{8}$ " hole drilled through the right side of the receiver ring, opposite the extractor. That extractor location is the most likely spot for any powder gas



escape between the bolt and the barrel, and a hole at this point would allow much of the gas to escape through it. This is the only thing about this action I don't like. I certainly don't think it a serious fault, but since there is no way to seal these holes, I would want the extra vent hole in the side of the receiver.

Markings

The Champlin actions are serial numbered. The number is stamped on the right side of the receiver ring and on the major working parts. The firm name, CHAMPLIN FIREARMS INC., is stamped on the left receiver wall and U.S. PATENT 3,494,216 will be stamped on the left side of the receiver ring.

Takedown and Assembly

To remove the bolt, raise the bolt handle and pull the bolt back while pushing forward on the bolt release lever at the left side of the receiver. To replace the bolt, the release lever must also be pushed forward until the bolt is well started in the receiver.

To disassemble the bolt proceed as follows: grasp the bolt firmly in one hand; with the

other hand rotate the bolt sleeve counterclockwise as far as it will go; then, using a screwdriver or some square-edged tool, draw the cocking piece back far enough so the nose of the cocking piece clears the cocking cam and the bolt sleeve can be turned further counterclockwise; rotate the bolt sleeve another turn and repeat the process until the cocking piece no longer prevents the bolt sleeve from being turned; now grasp the bolt sleeve top side up and, holding the bolt level, unscrew the bolt from the bolt sleeve until the two can be separated; lift out the firing-pin lock from the threaded stem of the bolt sleeve; the firing pin can then be unscrewed from the cocking piece and the firing pin, mainspring, cocking piece and bolt sleeve can then be separated. Reassemble in reverse order. In reassembling the firing pin, it must be turned in the correct amount so that when the bolt is completely assembled and the striker down, the firing-pin tip protrudes .060". If it projects more or less than this amount turn the firing pin in or out as required to obtain correct protrusion.

To remove the extractor depress the extractor plunger with a very small drift punch, slid-

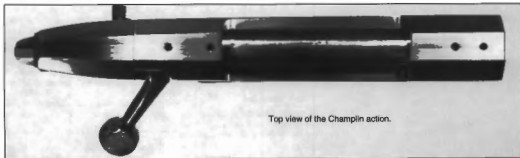
ing the extractor toward the center of the bolt-face recess. The ejector can be removed by driving out its cross pin. Reassemble in reverse order.

To lift the barrel and action from the stock, turn out the two guard screws; pull the trigger guard/magazine from the bottom of the stock. Slip the follower off its spring, and the spring out of the floorplate. The floorplate and floorplate latch can be removed by driving out their pins. In reassembling, the follower is slipped on the narrow end of the follower spring.

To remove the trigger assembly loosen the trigger mechanism tightening screw, then turn out the trigger-holding screw. Do not disassemble the trigger mechanism unless absolutely necessary, and then only if you know what you are doing.

The barrel is screwed very tightly into the receiver and no attempt should be made to remove it unless the proper tools are available.

Late word (1994) received from Champlin is that they are still building fine deluxe custom large game hunting rifles for the most discriminating hunters. Because they are of the finest quality, the production is limited.





Colt Sauer Rifle

AS THE NAME implies, the Colt Sauer sporting rifle was made for Colt's of Hartford, Connecticut, by the long established firm of J. P. Sauer & Sohn in Germany. The Sauer firm is perhaps best known for their fine quality over/under shotguns, rifles, and combination guns. The rifle made a big hit with U.S. hunters when introduced in 1973. Importation was discontinued in 1985.

The Colt Sauer sporting rifle is a fine piece of shooting equipment. Built around an action of unusual design which I will describe in detail later on, this rifle is well barreled and well stocked. There are two action lengths: a 10" action for 30-06 length cartridges and a shorter one for shorter cartridges.

The Colt Sauer Rifles

There are three different models of Colt Sauer sporting rifles made. The highest priced one is the Grand African Sporting Rifle, made only in the 458 Winchester Magnum caliber. It is stocked with a piece of African Bubinga wood, checkered, and fitted with a rosewood forend tip and pistol grip cap, and a recoil pad. On the 23.6" round tapered barrel are mounted a hooded bead front sight and a Lyman open rear sight. It weighs around 10.5 pounds.

The second model is the Colt Sauer sporting rifle with the long action. Standard chamberings are 25-06, 270, 7mm Magnum, 30-06, 300 Winchester Magnum and 300 Weatherby Magnum. It has a checkered walnut stock fitted with sling swivel studs, rosewood forend tip and pistol grip cap, and recoil pad. The barrel is 23.6" long, round and tapered. Weight is around 8 pounds.

The Colt Sauer Short Action rifle is the third model. It is stocked and barreled the same as the long action model and made in calibers 22-250, 243, and 308. Its weight is

around 7.5 pounds. The only practical difference between this rifle and the long actioned one is that the action is .750" shorter; the overall length of the rifle is that much shorter, also the magazine is shorter.

The Colt Sauer is a centerfire bolt-action rifle having a detachable, single-column magazine of three-shot capacity. The action has a bolt locking system that is very unique with retractable locking lugs on the rear of the bolt. But, more on this later.

It has an adjustable single stage trigger and the receiver is drilled and tapped for scope mounts. The blued finish on the metal is extremely well done. The bolt body and the magazine follower are highly polished. There is little to criticize about the stock although the eighteen-line checkering is a bit coarse for such a high quality rifle and should be better finished. The rifles are not lightweights by any means, and this is because their receivers are longer and heavier than receivers on most other turnbolt rifles of the same caliber. Even the so-called Colt Sauer short action is longer than most other actions regardless of their caliber.

Barrels are rifled by the hammer forging process, a technique now in common use by a number of rifle manufacturers in the U.S. and abroad.

A distinctive Colt feature of these rifles is the black and white rampart Colt trademark under clear plastic in the center of the pistol grip cap. Smith & Wesson used a similar approach on their Model 1600 turnbolt rifle with their S&W emblem.

The Action

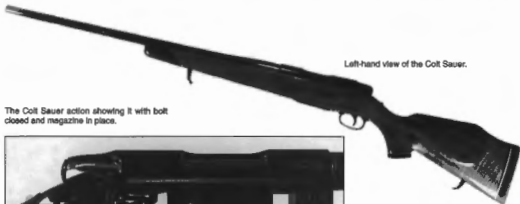
I am not sure whether I should call the Colt Sauer action a turnbolt action. It is not turnbolt in the sense that the bolt rotates in the receiver to lock and unlock it, or that the locking lugs rotate for the same purpose. Its

unique locking system makes the Colt Sauer unlike almost every turnbolt action that I am aware of; however, because it is operated by a bolt handle I will call it a turnbolt action. Anyway, it is the locking lug arrangement of this action which sets it apart from all other bolt actions I am familiar with. I will describe this unique arrangement later on.

According to Colt, the receiver is machined from a forging. It is of one-piece construction and it is long and heavy. The receiver of the standard or long action is 10" long and weighs 1.5 pounds. The receiver ring into which the barrel is threaded is approximately 1.290" and there are no recesses inside it since the locking lugs are on the rear of the bolt. The receiver wall between the receiver ring and bridge varies in thickness since it is machined thinner on top to reduce weight. Because the single column magazine is narrow and the ejection port is just wide enough to allow cartridges to easily pass through, a lot of metal is left at the bottom of the left receiver wall and right receiver rail. The result is that the receiver is strong, stiff and stretchless. Of the same thickness as the receiver ring, the bridge has more than ample wall thickness to be recessed inside for the locking lugs to engage in. Even if the receiver had been designed to have no tang the receiver would still be on the long side.

Before leaving the receiver, I must point out another feature in the Colt Sauer action that is unusual in a bolt-action rifle and that is that the receiver ring is split at the bottom with two heavy draw screws drawing the split together. I don't know the exact purpose of this feature, but I do know the ef-

(Above) The Colt Sauer Short Action model made for calibers 22-250, 243 and 308.



Left-hand view of the Colt Sauer.

The Colt Sauer action showing it with bolt closed and magazine in place.



fects of it on the barrel and a possible use it could be put to. A similar split receiver ring-screw tightening arrangement is used on some Martini single shot actions, including the Greener GP shotgun and the No. 15 BSA target rifle. On these Martini guns it is used as a takedown system—by removing the forend and loosening the draw screw which usually has a large knurled head, the barrel is loosened enough so that it can be unscrewed by hand. Conversely, when the barrel is replaced and turned by hand to the index marks, tightening the screw draws the receiver together to instantly lock the barrel securely in place. The action of drawing the split receiver together on the V-threads on the barrel and in the receiver causes the barrel to be drawn into the receiver and forces the shoulder on the barrel to abut with considerable force against the receiver. It is a simple barrel tightening arrangement and, where it can be applied, works. Sauer adopt-

ed this arrangement on the Colt Sauer action and it is a barrel tightening and fitting system that must work for them. I believe it could also be used as an extra barrel replacement system if they had ever decided to offer an extra barrel with the rifle.

The Colt Sauer bolt assembly is comprised of many pieces, about as many pieces as the total of parts for some well-known complete tumbolt actions. If I count the Colt Sauer striker as one part, the total of pieces in this bolt is thirty. This compares with only six parts for the Japanese Arisaka bolt assembly, seven for the Model 1917 Enfield and ten for the Model 98 Mauser. Even with thirty parts the Colt Sauer bolt is a very clever arrangement, and considering the unusual design of the locking lugs I cannot see how it could be made with fewer parts and work so well.

The main part of the bolt assembly is the bolt body. Its front face is deeply recessed

for the cartridge head and fitted with a claw extractor and plunger ejector, with both these small parts requiring pins and springs. Three gas vent holes are drilled in the right side of the bolt body, and underneath it are two grooves machined lengthwise to slide over the tips of the magazine. Another groove made in the ridge between the magazine grooves is for the bolt-stop. Inside the bolt body there is a hole for the striker, and at its rear the hole is enlarged to accept the front end of the bolt handle sleeve. Lastly, three evenly spaced notches are cut at the rear end to accept the three pivoting locking lugs. In addition to the triple set of lugs, a small but very important lever is fitted in a groove inside the rear end of the bolt body with one end of the lever projecting through a hole to the outside. This lever pivots on a pin and is tensioned by a small coil spring; its function is to lock the bolt handle sleeve from turning when the action is open.

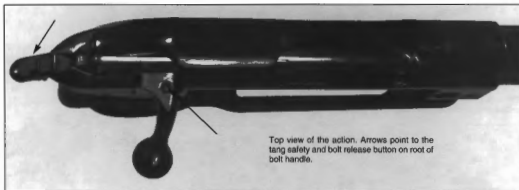
The second major portion of the Colt Sauer bolt assembly is the bolt handle sleeve to which the bolt handle is attached as an integral part. The front part of the sleeve is a slip fit inside the rear end of the bolt body, and it has three rounded grooves machined into it to slip under the locking lugs so that when the bolt handle is lowered to close the action, the locking lugs are spread outward. The locking lugs engage in the locking lug recess that encircles the inside of the receiver bridge. There is also a groove in this forward extension into which the locking lever can engage, and a lug which engages in a circular groove inside the bolt body to hold the bolt handle sleeve in place. Between the bolt handle sleeve and the bolt there is a thin washer and a ring. This ring is important as it is the part that retracts the locking lugs on the uplift of the bolt handle. The bolt handle sleeve is bored through to accept the striker, striker head and bolt sleeve cap.

According to one source, the striker is



Action with bolt open.

PART II: Commercial Rifles & Actions



Top view of the action. Arrows point to the tang safety and bolt release button on root of bolt handle.



Left side view of the action with magazine box detached.

made of three parts; namely, the striker rod, firing pin head and a small cross pin that holds the two parts together. However, I can find no evidence of a cross pin in the striker of my Colt Sauer. Even if there is a pin, the rod and the firing pin head are so well put together that I will consider them as a single piece. Anyway, the rear end of the striker rod has a short squared end and is threaded for the striker head; a small key slips on the squared end to prevent the striker from turning.

The bolt handle sleeve has an additional function. Machined into the larger diameter rear portion is the triangular cocking cam notch, which on the uplift of the bolt handle cocks the striker. The open end of the bolt sleeve is closed with a cap that slips into the sleeve and is held in place by a loose stud fitted in a hole on the bottom left side of the sleeve. The cap is about 1.5" long and is bored and slotted to fit over the striker head; the cap does not rotate with the sleeve. A light coil spring inside the cap and bearing on the striker lock key holds the key in

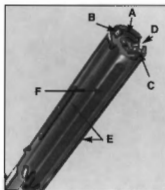
place. It is all very clever although complicated. The stud is kept in place and from dropping out when the action is cocked and/or opened, by the tailpiece on the striker head, and by the receiver when the action is closed. The bolt assembly has two more parts which I will describe later on.

Before leaving the bolt I should mention three more items. One is that the striker head has a tailpiece which, when the action is cocked, projects rearward beyond the bolt handle sleeve cap and serves as a visible cocking indicator. The second item concerns the mainspring, which is about the smallest one I have ever seen used in a centerfire bolt action rifle. The third is that the receiver is notched for the root of the bolt handle to serve as a safety lug and to supply camming power to the final closing and initial opening of the bolt; the root of the bolt handle slides along curved surfaces on corners of the notch.

The trigger mechanism is housed in a steel shell and is held in place under the receiver by two roll pins. The sear, the part

which holds the striker cocked, is located at the upper front of the mechanism and is fitted with a roller to reduce friction. This part also serves as the bolt-stop. At the rear of the mechanism is the alloy trigger and it is fitted with a socket set-screw to adjust the weight of trigger pull. Between the trigger and the sear is a toggle linkage which serves to control the sear—to hold it up when the trigger is pulled. The instruction booklet that comes with the Colt Sauer rifle states that adjustment screws are provided in this mechanism to control trigger slack (take-up) and over-travel, and that these two adjustments have been made at the factory and require no further adjusting. The trigger has some slack and over-travel which may be an annoyance to some, but the booklet states that both are needed for the trigger mechanism to function properly. The trigger pull on my rifle has a weight of just over 3.5 pounds which is satisfactory on a hunting rifle. The slack and over-travel movement was noticeable but not at all distracting.

A shotgun-style sliding safety is used on the Colt Sauer rifle. The safety button is ideally shaped and serrated for the shooter to get a firm purchase on it. It is also ideally located on the receiver tang for convenience of use—it can be operated easily and smoothly. Below the receiver a bar connects the safety button with the trigger and bolt lock mechanism. When the safety is in its forward, or Fire, position, a red dot appears on the tang, the sear in the trigger mechanism is locked, and the spring on the bolt lock plunger located in a hole in the receiver below the root of the bolt handle is moved into position to lock the bolt. While the safety does act to lock the bolt, the bolt can still be opened at will. This is accomplished by merely depressing the small button on the root of the bolt handle, which in turn depresses and unlocks the bolt lock and allows the bolt to be opened for unloading



The bolt head of the Colt Sauer bolt showing: (A) bolt face recess, (B) extractor, (C) ejector, (D) notch for the loaded chamber indicator, (E) magazine clearance groove, and (F) bolt-stop groove.



Shown here are the three pivoting locking lugs on the rear end of the bolt body. Arrow points to the bolt handle sleeve lock lever.

the chamber while the safety remains engaged.

A bolt-stop is positioned below the receiver at the rear edge of the magazine well. It is a piece of steel that is a slide fit in its cut in the receiver. It is activated by a steel lever mounted on the left side of the trigger housing. Pulling the trigger back about as far as it will go activates the lever and pulls the bolt-stop out of its groove in the bolt and allows the bolt to be removed. It is a bolt-stop system not unlike the one used in the Weatherby Mark V action, an action that the Sauer firm once made.

Loaded Chamber Indicator

Even though a lot of turnbolt actions and rifles are covered in this book there are still quite a number that I have not seen and examined. Therefore, while there may be others that have this feature, the Colt Sauer is the first one I have examined that has a loaded-chamber feature. Nowadays with lawsuits against manufacturers so common, this feature might spare Colt and Sauer a liability claim. Anyway, this little gadget on this rifle is a round-headed, rivet-like plunger fitted with a small coil spring in a hole in the receiver ring, with its rounded head at the very edge of the chamber and projecting beyond the chamber itself. It does not interfere with chambering a cartridge, and when fully chambered the head of the cartridge pushes the plunger aside so that its exposed end projects out of the receiver ring. It can be easily seen and readily felt. When the chamber is empty, the plunger is flush with the outside of the receiver. Because the plunger projects to the chamber line it is necessary to notch the rim of the bolt face recess to fit over it. This does weaken the rim of the recess but so does the cut made for the extractor. I think it is a worthwhile feature and other makers of bolt-action rifles should try to come up with

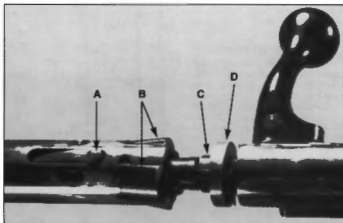


Photo shows the handle sleeve partly withdrawn from the bolt body and shows: (A) bolt handle sleeve lock lever, (B) two of the three locking lugs, (C) the grooved part of the bolt handle which expands the locking lugs to lock the bolt in the receiver, and (D) ring which retracts the locking lugs on the uplift of the bolt handle.

similar devices on their rifles.

The trigger guard of the Colt Sauer is a one-piece steel unit, making this rifle one of a very few modern bolt action rifles with the guard so made. The Sako is another. Two guard screws, one at each end, through holes in the guard and stock, hold the barreled action securely in the stock. The rear guard screw threads into the tang, while the front one threads over a separate stud threaded into the recoil lug of the receiver.

The magazine box slips easily through the opening in the trigger guard and it is held in place by a latch built into the guard just in front of the guard bow. This latch is spring tensioned and the portion of it that is depressed to remove the magazine lies flush with the guard. There is little chance that this latch will be accidentally depressed. A

protruding lip on the upper front of the magazine engages in a notch in the front of the magazine well in the receiver and holds the front of the magazine in place. To assist in the removal of the magazine, Sauer has put twin spring-loaded arms at each side of the magazine opening in the guard; on depressing the magazine release latch these arms push and tip the rear end of the magazine out enough so that the lip on the front is released from its hold. These arms also assist in reinserting the magazine correctly by holding the magazine box tipped down at the rear so that the lip up front is properly positioned with its notch before the magazine is fully inserted and locked in place.

The magazine is a well constructed box made of tempered sheet steel and it will hold three cartridges in a single column. The main

PART II: Commercial Rifles & Actions

part of the box is a single piece of steel folded so it is rounded at the front and square at the rear where it is spot-welded together. On each side near the front, rounded grooves pressed into it form shoulders inside to coincide with the cartridge shoulder to prevent cartridges from moving forward from the recoil of the rifle and thus prevent damage to the bullet points. There are also three holes on either side at the rear end of the box through which cartridges inside can be seen. The bottom edge of the box is flared and the magazine bottom, also made of tempered steel, slips in place on it. The follower, made of a polished steel stamping, is pivoted on a pin through the top rear fold of the W-shaped follower spring. A small flat spring attaches to the inside of the box and, which can be depressed through a small hole in the lower front left side of the box, holds the magazine bottom in place, allowing it to be removed to disassemble the entire magazine.

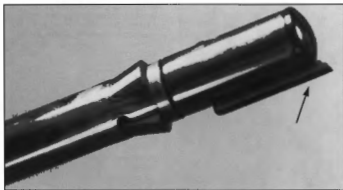
Takedown and Assembly

Make sure the rifle is unloaded by removing the magazine and opening the bolt. To remove the bolt assembly after the action is open, pull the trigger back very hard about as far as it will go and withdraw the bolt.

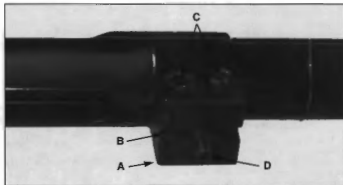
To disassemble the bolt proceed as follows: Grasp the bolt body in the left hand, depress the bolt handle sleeve lock which projects from the bolt body, and with the right hand turn the bolt handle clockwise 60 degrees or until it is stopped, then pull the bolt handle sleeve assembly from the bolt body, and remove the locking lug retractor ring with it. Remove the retractor ring and washer noting how the ring was positioned. No further disassembly of the bolt body is advisable. Replacement of broken parts is best done by the factory or by a highly competent gunsmith. This same advice also applies to the trigger mechanism and to a lesser degree to the bolt handle sleeve assembly.

To disassemble the bolt handle sleeve assembly, first uncock the striker by turning it counterclockwise in the bolt handle sleeve. This will expose the stud that holds the bolt handle sleeve cap in place, which was covered by the tailpiece on the striker head. With a finger depressing and jiggling the cap, and tapping the rear end of the sleeve on a bench top, the stud will fall out, whereupon the cap and the striker key spring can be removed from the sleeve.

Remove the striker key next with a tweezers. To assist in getting the striker reassembled again with the correct tip protrusion, use a Vernier caliper and carefully measure the distance from the end of the firing pin to some spot on the sleeve such as the lug on its forward end, then lock the caliper. Now unscrew the firing pin from the striker head and all the



Rear end of the assembled bolt showing the locking lugs extended from the bolt and the depressed bolt handle sleeve lock. Arrow points to the tailpiece on the cocking piece which serves as a cocking indicator.



An angle view of the underside of the receiver ring showing: (A) heavy recoil lug, (B) slit through the center of the recoil lug, (C) head and end of the two socket-head draw screws, and (D) front trigger guard stud screw.

parts can be removed. Reassemble in reverse order making sure that you obtain the correct tip protrusion.

To remove the barrel and action from the stock, remove the magazine, unscrew the rear trigger guard screw and then the front guard screw, lift the barrel and action assembly from the stock and then remove the trigger guard and screws.

Replacing any parts in the trigger-safety-bolt-stop mechanism is a job for the factory or a competent gunsmith. Do not attempt to remove the barrel. Instructions for disassembling the magazine are in an earlier part of this chapter. Reassemble the barreled action and trigger guard into the stock in reverse order.

Markings

My Colt Sauer rifle, which was made

after 1980, has the following markings: Stamped on top of the barrel in one line:

COLTS PT. F.A. MFG. CO.
HARTFORD, CT. U.S.A.

On the right side of the receiver ring in two lines is:

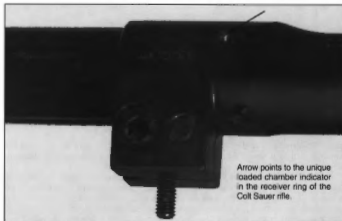
Made in W. Germany
by J. P. Sauer & Sohn

On the left receiver wall in two lines is:

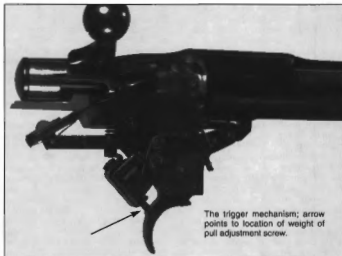
COLT SAUER
SPORTING RIFLE

The serial number is stamped on the left side of the receiver ring and the number is preceded with the letters CR. The caliber is stamped on the left side of the barrel breech. The follower in the magazine box is stamped in two lines:

COLT SAUER
Cal. .22-250 Rem.



Arrow points to the unique loaded chamber indicator in the receiver ring of the Colt Sauer rifle.



The trigger mechanism; arrow points to location of weight of pull adjustment screw.

The name COLT SAUER is also embossed on the recoil pad. The barrel, receiver and the bolt are proofmarked and the bolt carries part of the serial number. Colt's famous trademark symbol, the stallion and the spear, is outlined in white and imbedded under the clear plastic center of the pistol grip cap.

Comments

I have already injected a few comments and opinions about the Colt Sauer rifle in this chapter, but I have a few more that I want to mention here. There are many features of this rifle that I like very much and a few which I'd like different, but considering the whole rifle I have a high regard for

it. One thing is sure, it is a different rifle that works, and because it is different it appeals to me as it has appealed to many other riflemen.

I remember well when it was introduced and reading about it in *The American Rifleman* and other gun magazines. I particularly remember reading about the big game hunt that Colt sponsored for a group of gun writers, all using Colt Sauer rifles. I do not often write about a gun when it is fresh; I'd much rather write about a gun after everyone else has written about it and after I have played with it a long while and listened to others who have used it.

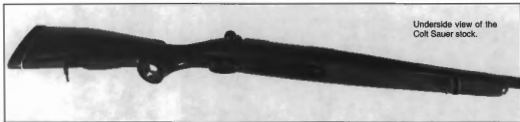
I will begin with the stock. I like the shape and the size of the stock very much.



Top view of the rear part of the action in the stock, showing the bolt sleeve cap, sliding tang safety, bolt handle, bolt release button and the notch into which the root of the bolt handle fits.

It is not too bulky in any place. I do not much care for the slight flare at the bottom of the pistol grip but I can live with it. I do not like the placement of the front sling swivel stud—it is much too far back for heavy recoiling calibers and ought to be at least 2" farther forward. I also think Sauer overdid it with the rosewood forend tip; had they made it shorter the swivel stud could

PART II: Commercial Rifles & Actions



Underside view of the Colt Sauer stock.

have been mounted further forward. For the 7mm Magnum and heavier recoiling calibers I would want no swivel stud on the forend, I'd want it on the barrel.

Very good quality walnut is used on this rifle, but I feel that Sauer should have used twenty or twenty-two line checkering instead of the eighteen line. I like the use of a bedding compound in the recoil lug and front guard screw area of this stock, and the pressure area in the front of the forend. The thick recoil pad is a good idea for calibers producing more recoil than the 243, but on the 22-250 and 243 caliber rifles I would prefer to have a steel or horn buttplate. The trouble with recoil pads is that they deteriorate.

In my section of the country, hunters going after antelope, deer and elk generally prefer rifles weighing a pound or so less than the Colt Sauer, and especially in calibers 243, 25-06, 270, 308 and 30-06. This rifle in the magnum calibers, and in 22-250 caliber for varmint shooting, is ideal in weight and barrel size and length, but in the other calibers a lighter and shorter barrel would give the weight reduction many hunters want.

The Colt Sauer action is on the heavy side and the receiver accounts for most of it. There are places on the receiver where metal could be safely and artistically removed to make it lighter, but I am not sure whether I am in favor of that being done. A few ounces could be subtracted from the action weight by making the trigger guard of a lighter material, but I am not in favor of that either. In fact, I've wondered why Sauer used an alloy to make the trigger, when, if it were made of steel no

more than an ounce would be added to the weight and then it would be an all-steel action.

My mention of the trigger leads to the following comments: A great many shooters are trigger conscious, often overly so and needlessly so. But it is a fact nevertheless. They often attribute every missed shot at target or game to the trigger. They insist on absolutely no-slick, no over-travel and an imperceptible trigger pull. They are usually frustrated shooters, but they keep on buying rifles in the hope of finding one that will do their shooting for them.

I find no fault with the way the Colt Sauer trigger performs. I expect it will function and perform as well even after five or ten thousand shots. Although unique, the toggle trigger system is by no means new and I know of at least one U.S. patent on the design. Anyway, the toggle system trigger of the Colt Sauer gives every indication that it will stand up. However, if I count all the many parts in this mechanism, the small pins, springs, etc., and take into consideration the limitations of the adjustments and their locations, I feel that Sauer could have done much better had they elected to use a more conventional trigger mechanism, one with fewer parts, one which had a full range of easily accessible adjustments. I like the safety arrangement of the rifle, as well as the bolt lock and the push button in the bolt handle to release it. I also like the bolt-stop, but I would prefer that it have its own

release rather than have the trigger as the release. I also like the loaded chamber indicator.

The magazine is excellent, and so is the trigger guard, magazine release and magazine push-out arrangement. With just a bit of practice the magazine can be quickly inserted. Nothing has been overlooked.

This action needs no bolt guide—the smooth unslotted interior of the receiver is the best guide possible. There is no hint of any binding or stiffness when I operate the bolt of my Colt Sauer rifle, and the bolt slides in the receiver about as smoothly as any of the modern bolt-action rifles that I have examined. The smoothness also extends to the cocking motion; that is, raising the bolt handle after firing. In this respect it is one of the easiest centerfire bolt actions to cock that I am familiar with.

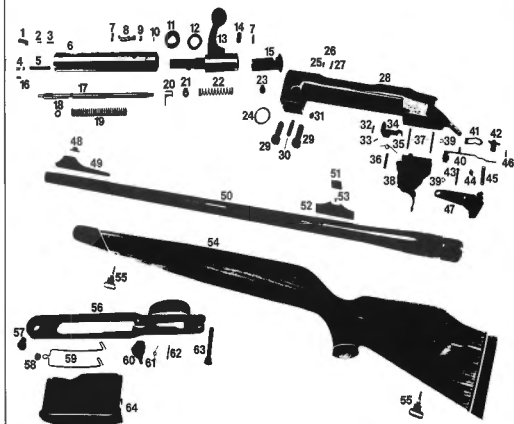
This brings me to the bolt. As mentioned earlier, the Colt Sauer bolt has many parts but on reflecting on it and taking the bolt apart a few times to study it, I can't see how the bolt could be made with fewer parts. I have to admire the ingenuity of its design and construction. I also like the short bolt travel made possible by the rear placement of the locking lugs. I also like the short 60-degree up-lift of the bolt handle. I do not particularly like the looks of the bolt handle—it reminds me of the handle of a Winchester Model 67 22 rimfire rifle I once owned. To me, the bolt handle looks as if it was bent to shape.

Dimensional Action Specifications

	Long action	Short action
Receiver length	10.00"	9.25"
Receiver diameter	1.365"	1.365"
Bolt diameter	.785"	.785"
Bolt travel	4.25"	3.625"
Striker travel	.3125"	.3125"
Bolt face recess depth	.115"	.115"

General Specifications

Type	..... Bolt action repeater, bolt operated by handle.
Receiver	..... One-piece steel construction with receiver ring split at bottom and supported by two draw screws.
Bolt	..... Non-rotating, multi-piece construction, three expanding locking lugs on rear of bolt, bolt handle on sleeve with root of handle serving as safety lug.
Ignition	..... One-piece striker, coil mainspring, cocks on up-turn of bolt handle.
Safety	..... Sliding tang safety locks sear and bolt.
Extractor	..... Claw type.
Ejector	..... Plunger type in bolt head.
Bolt-stop	..... Plunger mounted in bottom of receiver fits groove in bolt and released by pulling trigger back.
Trigger	..... Single stage adjustable for weight of pull.
Magazine	..... Single-column detachable box magazine.



Parts Legend

- | | | | |
|-------------------------|-------------------------|----------------------------------|-------------------------------|
| 1 Extractor | 17 Firing Pin Assembly | 35 Bolt Catch Spring | 52 Rear Sight Base |
| 2 Extractor Pin | 18 Firing Pin Ring | 36 Bolt Catch Pin | 53 Rear Sight Screw |
| 3 Extractor Spring | 19 Firing Pin Spring | 37 Trigger Mechanism Pins | 54 Stock |
| 4 Ejector | 20 Cocking Piece | 38 Trigger Assembly | 55 Swivel Assembly |
| 5 Ejector Spring | 21 Firing Pin Key | 39 Bolt-stop Link Pin Snap Rings | 56 Trigger Guard |
| 6 Bolt Body | 22 Mainspring | 40 Safety Connector | 57 Trigger Guard Screw, Front |
| 7 Bolt Body Lock Pins | 23 Bolt Cap Pin | 41 Safety Slide Spring | 58 Magazine Ejector Screw |
| 8 Bolt Body Lock | 24 Headspace Ring | 42 Safety Slide | 59 Magazine Ejector Spring |
| 9 Bolt Body Lock Spring | 25 Indicator Spring | 43 Bolt-stop Link Pin | 60 Magazine Latch |
| 10 Lug Pin | 26 Indicator Shear Pin | 44 Safety Link | 61 Magazine Latch Spring |
| 11 Closing Cam Ring | 27 Indicator | 45 Safety Link Spring | 62 Magazine Latch Pin |
| 12 Spring Ring | 28 Receiver | 46 Bolt-stop Link | 63 Trigger Guard Screw, Rear |
| 13 Pressure Lock Head | 29 Receiver Lock Screws | 48 Safety Slide Pin | 64 Magazine |
| 14 Lock | 30 Thread Screw | 49 Front Sight | |
| 15 Lock | 31 Safety Screw | 50 Barrel | |
| 16 Ejector Pin | 32 Bolt Lock Pin | 51 Rear Sight | |
| | 33 Receiver Lock Pin | | |
| | 34 Bolt Catch | | |

One of the reasons why the Colt Sauer action is easy to cock is the mainspring. As mentioned before, this spring is small as compared to the mainsprings of other bolt-action rifles. I also noticed that I did not have to fight it when assembling the bolt.

The sound of the striker fall appears normal, as if there was ample speed and power given to it.

From the information I have and beginning in 1984, the Colt Sauer rifle is no longer being imported by Colt. Although

my information is sketchy, it appears that the Swedish firm, Gevardsfabriket, Bakilutna, Sweden, recently made the gun as the Carl Gustaf 3000. Good as the design is, it appears that there is no U.S. importer for the gun at this time.

Cooper Model 38 Centerfire Rifle

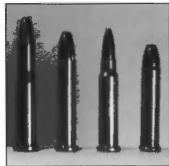
IMAGINE IF YOU can a healthy young man consumed by the desire to hike the Continental Divide from its southern end in New Mexico to the most northerly end at the Bering Strait. Imagine, too, the many and varied obstacles that he would encounter; hardships of the weather he had to endure; the mountains he had to ascend and descend; high plateaus over rocks, brush and sometimes snow; the streams and rivers he had to cross; all with the weight of a pack on his back. But despite all, he did it. It was not done in a single effort but in stages over a six-year period. It was a 10,000-mile trek. In the end he had accomplished something few other people had done. The man I am writing about is Daniel L. Cooper.

Cooper had another dream, too, and that was to design a rifle mechanism and to manufacture rifles built on it. Of course, this too he has also done, and the rifle shown here is a product of that dream. This was not all that easy, and the many hardships he overcame on his six-year hiking adventure was all the training and resolve he needed.

Cooper lived in Oregon and for several years in the late 1980s he found off and on employment in the company that manufactured the Kimber rifles. The Kimber firm manufactured a limited line of wonderfully fine and well designed, turnbolt rimfire and centerfire sporting rifles of a quality, to my way of thinking at least, that surpassed even the Winchester Model 52 Sporter. With his eyes and mind wide open, Dan surely must have learned a lot. When the Kimber firm went under and ceased manufacturing, Dan and all the other Kimber employees were out of work.

Before all this happened, Dan had become interested in a new cartridge. He wanted something special, something dif-

ferent for his rifle. In short, what he was looking for was a reloadable 22 WMR (Winchester Magnum Rimfire). He searched cartridge books for a case that might do for his dream cartridge and discovered the 5.5 Velo Dog designed long ago to be used in a small revolver for taking pot shots at dogs harassing a person riding a bicycle. Anyway, he settled on the Velo Dog case and he figured, rightly so, that if this case was made with a solid head and loaded with a modern primer, powder and a jacketed bullet, he might have something better than the 22 WMR, and have a reloadable one besides, something a little less than the 22 Hornet.



Pictured here in actual size are the 17 CCM and 22 CCM, flanked on either side by the 22 Hornet and the 22 WMR. The 22 CCM is less powerful than the standard 22 Hornet but can be handloaded to out perform the 22 WMR. Both are centerfires and quite ideal for use on the smaller varmints at moderate ranges. The 22 CCM can also be loaded down to 22 Long Rifle velocities and with cast lead bullets could be ideal for use on small game.

In a telephone conversation with Dan, I asked if he remembered his early school days, and about the question of which came first, the chicken or the egg? Then I asked him which came first, his new little cartridge or the Cooper rifle? He thought a moment and said, "Well, I suppose it had to be the cartridge."

The Cooper 22 CCM, which he named and registered, is only slightly larger than the 22 WMR and similar in ballistics. After considerable searching, Dan found a firm in Italy that would manufacture the cases and ammunition. Later, at the suggestion and with help from Mike Hill, this case was necked down to hold a 17-caliber bullet and it became the 17 CCM.

The dimensions of the 22 CCM cartridge are as follows:

Firm diameter	.307"
Firm thickness	.050"
Base diameter	.248"
Neck diameter:	
17 CCM	.197"
22 CCM	.244"
Case length	.158"

The 17 CCM has a shoulder diameter of .2445".

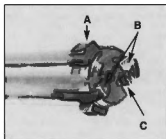
In the reloading data which Cooper furnishes with his rifles in these two calibers, he lists 2400 fps as top velocity with a 40-grain bullet in the 22 CCM, and a top load of 3275 fps with a 20-grain bullet in the 17 CCM. This seems reasonable to me.

In 1990, when the Kimber firm folded,

(Above) This custom-made Model 38 Cooper rifle is chambered for the 17 CCM cartridge. Daniel Cooper of Cooper Arms almost single handedly designed this cartridge and the rifle. He also designed a similar 22 caliber cartridge called a 22 CCM. This last cartridge is more or less a reloadable 22 WMR.



(Above) Right side view of the M38 Cooper action showing the bolt open. This detachable box magazine action has a bolt with three forward locking lugs. Arrow points to the unique plunger-type bolt-stop. This action is shown with the two-piece scope mount bases made to accept the Warne quick-detachable scope mount rings, rings very similar to the Brownell rings used on the Kimber rifle.

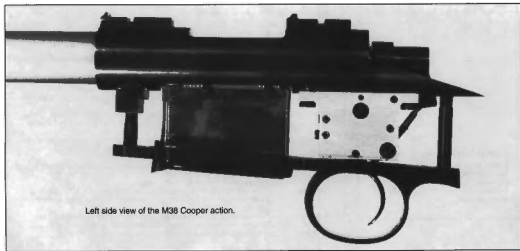


The Cooper M38 bolt head showing: (A) one of the three locking lugs; (B) the twin extractors and (C) the ejector groove.

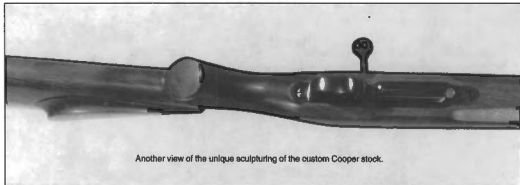
Dan and three friends who had been employed by Kimber since it began in 1989, moved from Oregon to Stevensville, Montana, where Dan made preparations to manufacture rifles. He sold his expensive sports car and motorcycle, got a Small Business Administration loan, found a building and secured the necessary machinery to make rifle actions and stocks. His nephew, Jason Stacy, aided him in design-

ing the Cooper actions, especially to handle the two new Cooper cartridges, the 22 CCM and 17 CCM.

The first Cooper rifles were finished in 1991, and as of 1994, Cooper Arms employs twenty persons. They turn out two different action types: the Model 36 made with triple locking lugs near the center of the bolt for rimfire and small centerfire cartridges, and the Model 38 and 21. The



Left side view of the M38 Cooper action.



Another view of the unique sculpturing of the custom Cooper stock.

Model 38 is made in the 17 CCM and 22 CCM calibers, and the Model 21 is for the 17 and 222 family of cartridges. The 1994 Cooper price list did not list the Model 38. You can find information on the Model 36 in the "Dope Bag" in the December 1993 *American Rifleman*. The Model 21 repeater is slated for 1995 production. It is the Model 38 action and rifle which I will describe here because it is the only Cooper model I have.

The M38 Cooper Action

The receiver is round and a thick recoil lug is dovetailed into it near the front end. The inside front of the receiver is threaded to receive the barrel shank and machined inside to receive the bolt; openings are cut through it for the loading port and magazine well if it is to be a repeater. The rear end of the receiver is machined to form a tang and a cut is made into the right side for the root of the bolt handle. Other machining is done to it to accept the trigger mechanism, bolt-stop, and ejector, and three grooves the size of the

locking lugs are cut the length of the bolt travel for these lugs and to form locking shoulders for the locking lugs.

The bolt of the M38 is constructed with three locking lugs on the forward end. These lugs are solid and substantial. The front of the bolt is recessed for the cartridge rim. Twin extractors fitted in grooves in the bolt head are spring tensioned and held in place on pins; one extractor is on the right and the other on the left. The right one has a hook to engage over the cartridge rim and to pull the cartridge or empty case from the chamber, while the one on the left has a dull hook to allow the case to slip away from it to aid ejection, when the ejector hits it.

The ejector is a spring-tensioned lever positioned in a groove in the bottom left of the receiver. On opening the action, an angled groove in the bolt head allows the end of the ejector to rise behind the case to tip and eject it from the action.

At the rear of the bolt is the low-profile bolt handle which is silver-soldered in place. Here, too, is the deep cocking cam and a shallower

notch, which, when the bolt is open, allows the tip of the cocking piece to slip into it to prevent the bolt sleeve from easily being turned.

Inside the bolt is the firing pin which is powered by a coil mainspring compressed between a collar on the firing pin and the front of the bolt sleeve. The bolt sleeve is threaded with its front end flared to close off the locking lug raceways. The firing pin is threaded into the cocking piece and a set screw in the underside of the cocking piece prevents the firing pin from turning. The hole in the rear end of the cocking piece is filled flush with the head of a screw.

At the right rear of the receiver, in an angled hole, is a sturdy spring-backed plunger which is the bolt-stop. It is so positioned that when in its normal position it extends part way into a locking lug raceway to stop the bolt when it is drawn back. This plunger extends upward out of the receiver to allow it to be depressed with the thumb so that the bolt can be withdrawn. I have never seen another bolt-stop like it, but it does the job it must do.

Dimensional Action Specifications

Action length	7.00"
Receiver ring diameter	1.150"
Bolt diameter	.555"
Bolt travel	2.375"
Striker travel	.145"

General Specifications

Type	.....	Turnbolt repeater operated by bolt handle.
Receiver	.....	One-piece, steel construction; recoil lug dovetailed in place; drilled and tapped for scope mount bases.
Bolt	.....	Two-piece construction; triple forward locking lugs; root of bolt handle serves as safety lug; bolt handle silver-soldered in place; bolt handle lift 60 degrees.
Ignition	.....	One-piece firing pin (striker) powered by coil mainspring; cocks on up-lift of bolt handle; ignition time .00412-second.
Magazine	.....	Detachable single column, stainless steel.
Trigger	.....	Single-stage; adjustable for weight of pull, over-travel and sear engagement.
Safety	.....	Rotary side tang safety, blocks trigger.
Extractor	.....	Twin extractors, spring tensioned, fitted in grooves in bolt head. Right-hand extractor has hook, left-hand extractor has dull hook to aid in ejection.
Bolt-stop	.....	Vertical spring-tensioned plunger on right side of receiver bridge.
Ejector	.....	Spring-tensioned lever mounted in slot in the receiver bottom.
Takedown	.....	None provided, barrel threaded tightly into receiver.



Left side of the M38 Cooper rifle. This rifle shows the receiver fitted with Warne bases for Warne scope rings.



An angle view of the middle section of the Cooper stock showing the neatly sculptured wood at either end of the magazine plate.

Pinned below the rear of the receiver is the trigger mechanism. Cooper describes it as a match trigger and so it is. Its components—the sear, trigger, pins and springs—are fitted inside a steel housing. Three set-screws with locknuts threaded into this housing are the adjustment screws to control trigger weight of pull, over-travel and sear engagement. The whole is little different from the usual trigger mechanism used on the better quality turnbolt rifles. The trigger on the rifle I examined and write about here was perfectly factory adjusted and I had no desire to adjust it further.

The safety on the Cooper action is very similar to the safety on the Kimber M82. It is a rotary-type safety mounted on the right side of the receiver and blocks the trigger when the safety is rotated rearward. It is fitted with a set-screw so that adjustments can be made to take up wear.

Also mounted below the receiver and precisely over the magazine well, on the repeater model only, is the perfectly shaped magazine holder. It is made of sheet stainless steel and is fastened in place by three socket-head screws; two on one side and one on the other. This holder might also be described as the magazine guide. Close in front of it is the magazine catch screwed to the receiver. It is made of spring steel and its angled and serrated end projects below the magazine when the magazine is in place. It is a good catch.

The magazine is also made of a heavy-gauge stainless steel sheet. It is perfectly shaped to fit smoothly into the magazine holder or guide. The upper edges of the magazine are curved inward to hold the small Cooper cartridges. At the bottom, the edges are bent outward so that the blued steel cover can slide in place and to allow it to be easily slid off to clean the magazine should that be ever needed. It is all quite clever. Inside the magazine is the flat magazine follower and a zig-zag spring. The magazine will hold three cartridges.

On the M38 single shot, the receiver is made without the magazine well, the magazine holder, magazine and the magazine catch.

The trigger guard/magazine plate is made of steel and inletted into the stock. Holes at both ends are for the two guard screws which thread into the receiver and recoil lug, to hold the barrel and action securely in the stock.

In size and shape, the stock on the Cooper rifle I had was similar to the one on my Mark-X Mini Mauser, except the Cooper stock was made of a quality piece of walnut, much better checkered and much better inletted. Cooper rifles are by no means low-cost rifles, and certainly not cheap. A Cooper rifle, regardless of the model or grade, is priced similar to a custom-made gun which it is. And because of that price you can expect a stock made of quality walnut with

plenty of color and figure in the wood. The stock is fitted with a rubber butt pad and metal pistol grip cap.

The first Cooper M38 rifle loaned to me came with its action fitted with scope mounts made to accept the quick-detachable Warne scope mount rings. They are a modification of the Brownell mounts Kimber used. I am sure that the tapped holes in the receiver will also allow the use of Redfield and Buehler bases, or one of these bases adapted to fit.

The Cooper M38 Rifle

After receiving and examining the first Cooper M38 rifle, I also had the opportunity to examine and photograph another one. Both were nearly identical except for the stocks, the second one having a better appointed stock. Maybe I should say a more custom-made stock. Anyway, both rifles were chambered for the Cooper 17 CCM cartridge, both fitted with 24" varmint-weight barrels, and they weighed about 7 pounds. They were adult-size rifles, and although I had no opportunity to shoot either one or test them for accuracy, I am quite sure I would not have been disappointed. If I had had one of them in either the 17 or 22 caliber forty years ago I would have had a lot of fun shooting it. I think I would have preferred the 22 CCM because of the bullet supply and because I could have used cast bullets. I do not believe I would have used either caliber for small game hunting because



Another view of the Cooper M38 rifle.



An angled view of the Cooper action in the stock.

I have never found or used a cartridge more adequate for this sport than the 22 Long Rifle. But for shooting pests such as the stripped ground squirrel, flickertails and crows within range there could hardly be a better rifle or caliber.

Both rifles had stainless steel barrels which would attract a magnet and this meant 416 stainless steel. Both rifles had superb trigger pulls—I could not have asked for anything better and I had no reason to adjust them beyond the factory adjustment. Both stocks had a lot of well-done checkering on the forends and pistol grips, and both were fitted with Packmayr basket-weave rubber buttpads. There were the sling swivel studs, too, but I never have had any use for them on a varmint rifle.

The stocks on both were made of dense Claro walnut, but of the two the last Cooper

rifle I had was the most "custom" one. The one feature I noticed first was the beautiful shaping of the stock at the bottom of the action and I have tried to show this in a photo. The second thing was the well shaped and shadow-lined cheekpiece. It was not over-done, just tasteful. I could live without the raised comb, but even that feature was nicely done. If I had ordered this rifle and paid the extra cost, I would have asked for an ebony forend tip and a pistol grip cap.

As I write this (1994) the Cooper firm is only four years old. Although a lot has happened there, the Cooper rifle is still in its infancy, and if the experience of many other beginning arms designers and manufacturers in their early years tells us anything, it tells me that Daniel Cooper is bound to make some changes and possible improve-

ments to his actions. By the time you read this that may have already happened.

Markings

Stamped on the left side of the receiver is:

17-532 Cooper Arms M38

On the left side of the barrel breech is stamped the caliber.

In a letter received from Dan, he stated that the Cooper M38 Repeater was obsolete. This meant that the M36 had taken its place. Earlier in this chapter I described the locking system of both the M38 and M36, stating that the M36 had the three locking lugs on the bolt near the middle, while the M38 bolt had the locking lugs on the front of the bolt. I can see the advantage of having the locking lugs on the middle of the bolt rather than up front because the middle position affords these advantages: (1) by eliminating the locking lug shoulder and locking lug recess in the receiver, the gap between magazine and barrel breech is also eliminated; (2) which allows the magazine to be placed close to the barrel breech; (3) which makes for a shorter bolt travel; and (4) makes for much more reliable and smoother feeding of the cartridges from the magazine to the chamber. Neither the bolt nor the action is weakened with the middle locking lug location. I had no opportunity to examine an M36, but I believe every other feature of the M38 is also retained, including the trigger, safety, bolt-stop, extractor and magazine, as well as the wonderful classic walnut stock. The two short Cooper cartridges, as well as the rimfires, necessitated this change and the Cooper rifle is better for it. If, in addition, the bolt were made in two parts as Ruger does in their Model 77/22, and I am not sure whether or not it is, it would be a better rifle still.



Dakota Arms Model 76

RIFLEMEN WERE SHOCKED when in 1964 Winchester announced that they were discontinuing the manufacture of their Model 70 bolt-action rifle, and in the same breath announced they were introducing a new Model 70. Of course, I wondered, as I am sure every fan of the original M70 did, what the new one would be like. Would it be an improved M70, or would it be greatly altered? Or, would it be manufactured differently and, if so, how? Also, would the new gun be cheaper or more expensive? We soon found out when the new rifle appeared on the market and gun writers began writing about it. And were we disappointed? We sure were.

As it happened, the "new" Winchester M70 was not nearly as bad as most M70 fans believed, but it was indeed a far cry from the original gun it replaced. Regardless of what it was all about, it took the Winchester people more than twenty-five years before they redeemed themselves by bringing out a very close replica of the original design which they call the M70 Classic.

Many riflemen decried the fact that the old M70 might never again be made. However, Don Allen and gun designer Peter Grisiel did something about that. Together they worked to design an action that would have all, or most, of the attributes of the old M70. Doing this took time and the end result was an action that looked mighty like the old M70 Winchester. Right away riflemen began referring to it as a copy or reproduction, and as one gun writer explained, "The Model 70 Winchester action, the turnbolt globe beloved by riflemen all over the globe, is born again."

They were not altogether wrong, or right either. Anyway, Allen and Grisiel called it the Dakota Model 76 and made ready to manufacture it. This was about 1986 and the first actions were announced for sale in 1987. Starting from a modest beginning, Don Allen

and his wife have built a successful business and as of 1994 employ thirty people. Don is most interested in the manufacture of stocks, and the custom rifle operation is guided by his wife Norma. Under her direction, the Dakota Arms firm is more or less a custom rifle business, building rifles specifically to customer specifications. The customer chooses the style or type of rifle he or she wants, the caliber, barrel size and length, sights, grade of stock wood, stock pattern, etc. Generally, however, the customer selects the rifle wanted from an example shown in the Dakota Arms brochure. All are more or less pure classic in style, beautiful guns with fine English walnut stocks, well checkered and finished, and with metal parts extremely well made, fitted and finished. The Dakota rifles are accurate, durable and of very high quality.

The Dakota M76 Action

The receiver is entirely machined from a solid piece of chrome moly heat-treated steel. Looking at it from the outside it looks very much like the receiver of the Pre-'64 M70 Winchester. However, closer inspection will reveal two major changes.

The first one is inside the receiver ring. Designer Grisiel chose not to use the cone-type breeching in which the breech face of the barrel is cone-shaped, but instead made the breeching like that of the old standby M98 Mauser with its internal collar. With this collar the barrel breech is flat and the barrel fitted so that the breech and the shoulder on the barrel contact this collar and the front of the receiver. Most gunsmiths will take great pains to give these contacting surfaces equal pressure. When the barrel is set up tightly both surfaces will be equally tight. As with the Mauser M98, the Dakota has a slot cut through it for the Mauser-type extractor hook.

I have nothing against the cone breeching except that fitting a barrel to such an action requires considerable more effort than fitting a barrel to the M98 Mauser type of action.

The second major difference is the bolt-stop, which is entirely different from the M70. It is also different from any other bolt-stop in all of the actions described in this book. I have never seen another like it. This important part is so well hidden in the left side of the receiver-bridge that it appears at first to be part of the bridge. Its main part is a round vertical stem that fits through the bridge to intersect the left locking lug raceway with a horizontal lever or arm attached to it; the lever hides in a groove cut into the side of the receiver bridge. It is this lever that is cleverly hidden because it seems to have been machined level with the side and rear of the bridge. Of course, this bolt-stop is spring tensioned inside the bridge to hold it in the closed and opened position. The small end of this lever is serrated and lies nearly flush with the rear surface of the bridge. Finger pressure at this point is enough to rotate the bolt-stop.

The vertical stem is machined to perform three functions. First, it serves as the bolt-stop to halt the rearward travel of the bolt. Second, being positioned to close off the locking lug raceway it becomes an effective seal against any powder gases from a ruptured case. Third, it is also a bolt guide or anti-bind feature in that it has a concave surface to match the convex surface of the bolt. This stem is also milled so that when the lever is swung 90 degrees outward it clears

(Above) Available in any caliber from 22-250 to 458 Magnum, the Dakota M76 Classic big game hunting rifle must be considered as one of the finest turnbolt rifles made.



Right-side view of the opened Dakota M76 action.

the way for the locking lug to pass by on removing the bolt from the receiver. The small hump near the center of the original Model 70 bolt, which served as the bolt guide and anti-bind feature, has been eliminated on the Dakota bolt. This function has been taken over by the clever bolt-stop.

The Dakota M76 receiver is drilled and tapped for scope mounts. On the rifle I examined, and which is pictured here, the action is fitted with a set of bases to accept Redfield rings. These bases are custom-made to fit so neatly that they seem to have been made integral with the receiver, especially the front one.

The Bolt

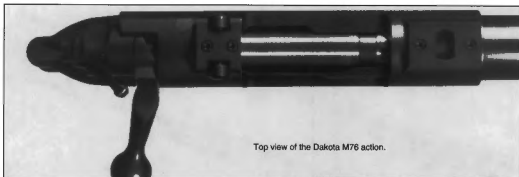
The bolt in the Dakota M76 appears to be of one-piece construction and in a sense it actually is. However, the bolt handle is made as a separate piece and by some advanced electrical process it is fused to the bolt. After finishing there is no evidence whatsoever that the handle was made as a separate piece. Because of the Mauser M98 breeching, the dual opposed locking lugs are set back the same amount as the thickness of the ring inside the receiver, actually the same as with the Mauser M98 bolt. Both lugs are solid. This breeching is the same as if the barrel

breech were recessed for the bolt. If I were given a choice between the M98 breeching and one like that in the Remington M700, I'd take the former, and especially so if the action has the Mauser-type extractor, which the Dakota has.

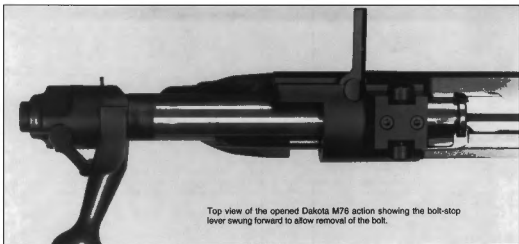
Dakota's extractor is the standard Mauser M98 type mounted on the bolt with a collar. The bolt face has an undercut recess for the cartridge head. This allows cartridges fed into the chamber by the bolt to rise from the magazine and allow the rim to slip under the extractor hook, so that if for some reason the bolt is not fully closed, then pulled back again, the cartridge will be ejected. This is



Left-side view of the Dakota M76 action. Can you find the bolt-stop?



Top view of the Dakota M76 action.



Top view of the opened Dakota M76 action showing the bolt-stop lever swung forward to allow removal of the bolt.



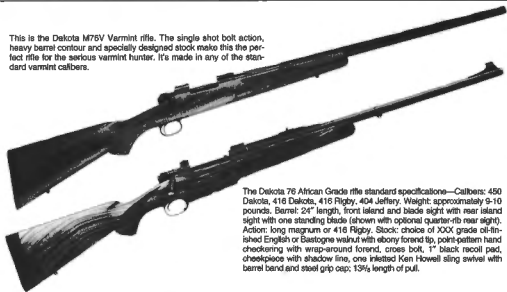
Don Allen is best known for his custom-made stocks. He is shown here at work at his stock routing machine.



Don and Norma Allen, owners of Dakota Arms.

PART II: Commercial Rifles & Actions

This is the Dakota M76V Varmint rifle. The single shot bolt action, heavy barrel contour and specially designed stock make this the perfect rifle for the serious varmint hunter. It's made in any of the standard varmint calibers.



The Dakota 76 African Grade rifle standard specifications—Calibers: 450 Dakota, 416 Dakota, 416 Rigby, 404 Jeffery. Weight: approximately 9-10 pounds. Barrel: 24" length, front island and blade sight with rear island sight with one standing blade (shown with optional quarter-rib rear sight). Action: long magnum or 416 Rigby. Stock: choice of XXX grade oil-finished English or Bastogne walnut with ebony forend tip, point-pattern hand checkering with wrap-around forend, cross bolt, 1" black recoil pad, cheekpiece with shadow line, one inletted Ken Howell sling swivel with barrel band and steel grip cap; 13½ length of pull.

called controlled feeding, although I have always described it as preventing double loading. Just the same, it is an ideal system on a hunting rifle.

The ejector in the Dakota M76 is patterned after the one in the pre-'64 M70 Winchester. It is a simple spring-tensioned lever positioned at an angle in the bottom of the receiver. An angled short groove in the bolt head, just under the left locking lug, is there for the front tip of the extractor to rise into when the bolt is opened to eject a cartridge or fired case from the action. It is a time-proven and faultless ejector system.

Again, as in the Winchester M70, the bolt sleeve, firing pin, mainspring, cocking piece and safety parts nearly duplicate the same parts in the pre-'64 M70. Unlike the M70, the Dakota M76 has no bolt sleeve lock, a part which has no important function. The safety is especially good. It is mounted in the bolt sleeve and when swung back the safety locks both the striker and the bolt; swung forward all the way the rifle can be fired; and swung to an intermediate position only the striker is locked. It may not be the fastest and handiest safety to get into firing position, but once the shooter gets acquainted with it that disadvantage is gone.

Although I have not tried it, I do not believe that the trigger or the two main parts of it are interchangeable with the M70 Winchester. Both are very similar and both are based on the same system. I have written

about the M70 trigger a number of times, but a simpler and more reliable and functional trigger has not been invented. I well know that many rifle shooters are extremely trigger conscious. They insist that a trigger have a very short, crisp and light let-off with absolutely no excess take-up or over-travel, and made so that all of this can be adjusted. A lot of this is nonsense. These same shooters may never be satisfied and they will always blame a missed shot on "that damn trigger." If I had to rely on a trigger to do what it is supposed to do, under any and all weather, shooting and hunting conditions, I'd choose the M70 trigger. It is the one that the makers of the Dakota rifle chose. My son, Mark, who has had a lot of experience shooting Winchester Model 70 target rifles, has never complained about the trigger.

The Dakota trigger is adjustable only for weight of pull and over-travel. It needs no other adjustment, and if you ever obtain this rifle you probably will not want to make any adjustment to it. Even if you are caught in a dust storm or in an icy rainstorm, the trigger will do its job. It is the last thing you need worry about.

The Dakota M76 all-steel trigger guard assembly is also a close copy of the Winchester M70; the magazine box, trigger guard, hinged floorplate and floorplate catch are essentially the same, with the exception that the trigger guard and magazine plate is of one-piece construction, and that the center

guard screw has been eliminated. Another difference is that the magazine follower has its ridge on the right side rather than on the left, as in the Model 70. Outwardly, the floorplate catch, looks like a Model 70 catch, but on the Dakota it has two steps so that if depressed only partially, perhaps accidentally, the floorplate will open only slightly; to release the floorplate entirely the catch must be fully depressed.

As Winchester has done with the M70 Classic, the Dakota people dropped the use of a forend screw.

So far in this chapter I have not described some of the features in detail. Therefore, I would suggest you turn to my description of the Winchester pre-'64 action so that you can better compare the Dakota action with the M70.

Basic Dakota Models

Shown nearby are the basic models, descriptions and specifications of each of the four rifle styles manufactured by Dakota Arms Inc., Sturgis, South Dakota.

To write this chapter, I had the opportunity to examine, handle and play around with a Dakota M76 for about a week, and you can believe me when I say that I had that rifle (shown at the beginning of this chapter) in my hands many times during that period. I was truly impressed with it. If I had been, or still was, a deer, antelope or elk hunter, I could not have chosen a bolt-action rifle better in every



The Dakota Model 76 Classic Grade hunting rifle standard specifications—Calibers: all standard calibers (22-290 through 458 Win.) Weight: approximately 7.5 pounds. Barrel: 21" length standard for short action, 23" for all other actions. Action: short, standard, short magnum, long magnum. Stock: choice of X grade oil-finished English, Bastogne or Claro walnut, hand checkered in a classic point pattern with panels. Fitted with 1" black recoil pad, steel grip cap and single screw stud sling swivels; 13 $\frac{1}{4}$ " length of pull.



The Dakota Safari Grade, right-hand model standard specifications—Calibers: 257 Roberts through 458 Win. Mag. Weight: approximately 8.5 pounds. Barrel: 23" length, front ramp and rear island sight with one standing blade. Action: short, standard magnum, long magnum or 458 short magnum. Stock: choice of XXX grade oil-finished English or Bastogne walnut with ebony forend tip, cheekpiece with shadow line, infitted swivel and barrel band, steel grip cap and 1" black recoil pad. Point-pattern hand checkering with wrap-around forend: 13 $\frac{1}{4}$ " length of pull. This example has the optional quarter-rib.

way than this one. It was a delightful sensation to imagine a buck deer out there a hundred yards or so, swinging the rifle to my shoulder, and in a split second or two, aim and fire and see the deer drop. The rifle was designed and made to do that job. However, I

did not have to imagine how this fine rifle looked or felt in my hands, or notice the smoothness of operating the action. Because the receiver and bolt were mated to close tolerances, there was very little wobble of the bolt when the action was open. Everything

else behaved the same way. Even though the stock had no cheekpiece, which is mostly just an ornamentation anyway, the stock was perfect. The whole rifle spelled quality. This quality does not come cheap, but if you demand it, the Dakota Model 76 has it.



FN Actions & Rifles

FOR A NUMBER of years Stoeger Arms imported genuine Oberndorf-made Model 98 actions into the U.S. These were fine actions—no question about that—but they were high priced. For example, in 1939 Stoeger listed the lowest-priced M98 action at \$70, while in the same catalog the standard grade complete M70 Winchester rifle was only \$61.25. Obviously the customer was paying very dearly for that “Mauser banner” stamped on the receiver. However, by this time Germany was deeply involved in making war, and her arms plants were turning out nothing but military weapons. So, Stoeger had to turn elsewhere.

Fabrique Nationale (FN for short, the same firm which makes Browning pistols, rifles and shotguns) in Liege, Belgium, was and is a very large arms making plant. For many years they had been making various models of Mauser rifles, including many thousands based on the M98. When Stoeger could no longer get original Mausers they turned to FN, and the FN Mauser action was announced in Stoeger's 1941 catalog. Calling it their “Stoeger Peerless Action,” it was only \$18, unbelievably low, even then.

The Peerless action was nothing other than the standard M98 military action, as made by FN, except that the magazine was made to handle 30-06-length cartridges and the bolt handle was bent down sharply at its root. It was described as being made of high-grade steel, properly hardened, well polished and blued, except for the bolt parts which were left bright. It was the large ring type with the thumb slot in the receiver wall, clip-charger guideways in the receiver bridge and the standard double-stage military trigger.

When I received the 1941 Stoeger catalog, I remember that I quickly ordered one FN action, but my money was refunded. No wonder, for German troops invaded Belgium in May of 1940 and Stoeger's supply was most

likely cut off before it started. Stoeger's 1942 catalog did not list these actions.

A couple of years after the close of WWII, the FN 98 action appeared again, this time imported by Firearms International of Washington, D.C. I found the first announcement of it in the November, 1947, issue of *The American Rifleman*. It was called the “1947 FN Mauser” action, but except for its very low profile bolt handle, it was the same as the FN action offered by Stoeger in 1941.

FN Action Improvements

Here was an action that gunsmiths had long been seeking, although it still had a number of features retained from the military action. But, as FI announced in their 1947 ad, changes would be made on it in accordance with the wishes of the American shooter. This was done as will be seen.

In January, 1948, it was announced that the following changes had already been adopted: 1) bolt handle knob partly checkered; 2) trigger changed to a single pull, no-slack let-off; 3) a new type of floorplate quick-release plunger for instant removal; and 4) the thumb slot was eliminated. This last item was the major and most important improvement, since it made the receiver much more rigid.

By May, 1948, the action could be ordered fitted with a double-set trigger mechanism. By fall of 1948 the action was further improved by having a new low scope safety, and the receiver bridge was modified by eliminating the raised portion and the clip-charger slot. Tapping the receiver for a receiver sight and/or a scope mount was also started at this time, though the bridge was not tapped. Up to this time these actions were made for the standard 30-06 length and head-sized cartridges. By the end of 1948, barreled actions were offered in 30-06 and 270 calibers, as were complete FN Mauser

deluxe rifles and, by the end of 1949, calibers included the 257 Roberts, 250-3000 Savage and 300 Savage. Within a short time two other calibers were added, the 7mm Mauser and 220 Swift.

The actions for these different calibers were all alike except that a sheet metal filler block was fitted in the rear of the magazine box, along with a shortened follower and spring, for the 257 Roberts and the shorter cartridges. The first FN barrels had an unusual “stepped” contour, but this changed in 1952 when the FN smooth-contoured, lightweight barrel was introduced.

The FN Magnum action, introduced early in 1953, was made to handle the then two most popular magnum cartridges, the 300 and 375 H&H Magnums. This “magnum” action was nothing more than the standard 30-06-length FN, but with the magazine box extended in front, the feed ramp altered to accept the 3.60” magnum cartridges, and the bolt head and extractor opened up for the head of the belted case. Engraved FN actions were also made available at about this time.

An important development in the Mauser action came in 1955 when the “bench-rest” action was announced. This was a single shot action, the solid bottom receiver minus any magazine-well cuts. The trigger guard was merely made with a long forward strap or tang through which the front guard screw passed. The BR action was made to handle three different sizes of cartridge heads: 222, 30-06 or belted magnum head sizes, with the bolt face and extractor altered appropriately.

(Above) Mannlicher-stocked 270 sporting rifle built by the author. Based on the FN Deluxe action, this rifle has a Fajen stock, Douglas barrel and a B&L Baller scope in B&L mounts.

As soon as the various scope mount makers began standardizing the hole spacing in their mounts, FN began tapping the top of the receiver of all of their actions so that these mounts could be easily and quickly installed.

When new factory cartridges were developed, such as the 243, 308 and 244, the FN line was promptly extended to include them. It was also extended to include the 458, 264, 7mm and 300 Magnums. Then, as some of these cartridges fell into disfavor with shooters, they were dropped from the FN lineup. By 1971 FN rifles and barreled actions were available only in the following calibers: 243, 270, 7mm, 308, 30-06, 7mm Magnum, 300 Magnum and 264 Magnum. FN actions alone remain available.

Around 1957, the standard FN action became the FN Deluxe action, and a new action was introduced called the Series 300. The new action incorporated the following improvements and changes: a streamlined bolt sleeve, made without the safety; an adjustable, single-stage trigger which included a right-side sliding-tang safety, and an all-steel hinged-floorplate magazine. This was a fine modern action and, within a short time, the "Series 300" name was changed to "FN Supreme." By 1964 the FN Deluxe model was dropped, with only the Supreme actions, barreled actions and rifles remaining. To replace the Deluxe types a new model was introduced, called the Musketeeer, but these actions were not offered separately.

In the 1970s the FN firm ceased production of these actions and rifles. There is a most interesting article in the December, 1989, and February, 1990, *American Rifleman* on the history of the FN firm.

A Quality Action

FN actions were made to the usual exacting FN quality, a quality so outstanding that no one should question it. I don't know what steel was used in the receiver and bolts of these actions, but you can be sure that the best available steel was used, and that the various parts were properly hardened for the work they do. Like the usual M98 military action, the FN receiver depends more on its design for strength than on special steels or heat treatments. The FN receiver was probably made of a top quality, low-carbon steel and surface hardened, which results in a very tough receiver, one that will "give" under extreme stresses but will not shatter. The FN bolt is much harder than the receiver, especially in the area of the locking lugs.

FN actions were finished and furnished in the "white," that is, not blued but with the metal in its natural bright state after machining and polishing. The bolt, bolt sleeve, cock-



The 1947 FN Mauser action, the first of the famous Belgian-made M98 Mauser-type actions.



FN single shot "benchrest" Deluxe action.



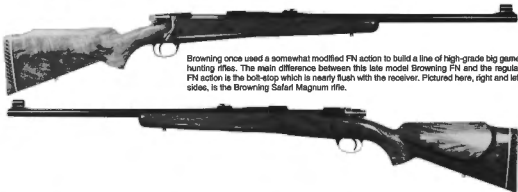
FN Series 300 or Supreme action.

ing piece and a few other small parts were usually polished very highly, and needed no further polishing. The bolt-stop and bolt-stop spring often had a light "heat" blued finish. At first, the receivers were usually finished polished, but the later ones were not completely finished and usually required further polishing before being blued. This also applies to the trigger guard and floorplate, except for the inside of the trigger guard bow which is seldom factory polished at all.

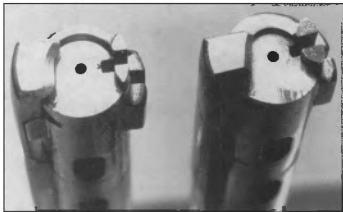
Markings

Every FN action was subjected to a proof test in the Belgian government proof house. Only actions which passed this test were proofmarked and sold, with the usual final Belgian proof stamped on the receiver ring. Most FN actions I have observed also have **MADE IN BELGIUM** stamped on the lower part of the receiver. There are usually some inspector's marks stamped on the bottom of the receiver also.

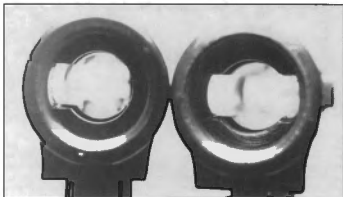
PART II: Commercial Rifles & Actions



Browning once used a somewhat modified FN action to build a line of high-grade big game hunting rifles. The main difference between this late model Browning FN and the regular FN action is the bolt-stop which is nearly flush with the receiver. Pictured here, right and left sides, is the Browning Safari Magnum rifle.



FN Mauser bolt heads: left, 30-06; right, 222.



Looking into the front of M98 (left) and FN Mauser receivers. The M98 shows the inside collar cut out for the extractor, typical of all M98 military actions and early FN actions. The FN receiver has the collar cut out in two places, opposite the normal extractor cut-out. This is typical of all late FN actions, including magnum and benchrest types.

Early FN Mauser actions usually had the large FN monogram impressed on the receiver ring, as well as having the factory name and address stamped on the left receiver wall. Later on these markings were omitted, with only the letters FN within a small circle stamped on the side of the receiver ring. The date (year) of manufacture was also stamped on the early actions.

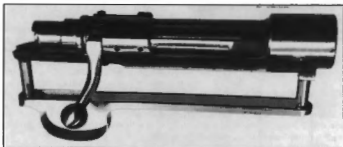
To my knowledge, the separate FN actions were not serial numbered, nor were the parts of the action numbered in any way.

FN Action Details

The commercial FN action is, to describe it briefly, merely a modernized M98 military action. FN had a lot of experience in making the latter type, including 30-06 rifles, and the commercial FN action was a natural result of this activity. Like the military action, the sporting version is perhaps the world's most popular and widely used centerfire turnbolt action.

Apart from the changes previously noted, the FN action has all the basic features of the military action. It has the Mauser "large ring" receiver with the internal collar, the same barrel threads, the same bolt with its two forward locking lugs and the third safety lug, the same bolt guide rib, extractor, firing mechanism and the same trigger guard and magazine. The fact is that practically all FN action parts are interchangeable with the standard 98 military action. FN actions had features that only skilled custom gunsmiths formerly built into military actions. Therefore, to describe in detail the construction and functioning of the FN action would be merely to repeat the information given in the chapter on the Model 98 Mauser action.

When FN actions became available it was no longer sensible to have a military M98 action completely remodeled. This sort of work was only practical if you could do it yourself, or if you didn't care what it cost.



Late-type FN Supreme single shot benchrest action with the ungrooved forward guard tang. This action was furnished without a trigger mechanism.

FN Action Users

One of the first large scale custom rifle makers to adopt the FN action was Weatherby of South Gate, California. They used these actions almost exclusively for their expensive custom rifles in the standard and Weatherby Magnum calibers until 1958, when they introduced their own bolt action. That Weatherby chose to use the FN action was probably the very best endorsement that could be given it. The fact that the FN action did not prove entirely satisfactory for some of the very long Weatherby Magnum cartridges was not the fault of the action, as we shall see later.

Several large gunmaking firms also chose the FN actions on which to build rifles bearing their firm names.

As already mentioned, FN made rifles on these actions. The Browning firm, which is associated with FN, also made several fine grades of high power rifles on the slightly modified version of the FN action. A number of other firms formerly made rifles on these actions, including Sako, Parker Hale, Colt, Marlin, High Standard, Winslow, Harrington & Richardson and others. No bolt action could have a more distinguished endorsement than the wide use of the FN.

Receiver Ring Collar

FN actions were made at first with the full inside collar, just as in the M98 military action, with the collar slotted on the right side for the extractor. At some point FN began to fudge and, thereafter, slotted the collar on the left as well, leaving only partial collars top and bottom. This was done for one reason only—to make milling the left locking lug raceway much easier. I feel this was an unwise move, and that Paul Mauser would think the same. Although I have no solid evidence to indicate that dividing the collar has affected the strength or safety of the action, I

would certainly rather have the collar remain as Mauser designed it.

Trigger and Safety

The original trigger furnished with the FN Deluxe actions was nothing more than a double-stage military trigger, modified to a single-stage pull. A poor trigger setup at best, it would do if one didn't mind a long and heavy pull. Most owners of rifles built on this action soon replaced this poor trigger with one of the several commercial single-stage adjustable triggers on the market, such as the Timney or with a set-trigger.

When the Series 300 or FN Supreme action was announced a new trigger was introduced with it. This was the Sako No. 4 trigger, which is described in detail in the chapter on the Sako actions. This trigger, fitted with a side safety, was used on the Supreme action, and fitted without the safety on the Deluxe action.

This trigger underwent unimportant minor changes at first. It had provisions for limited adjustment of weight of pull, and a trigger-stop adjustment, but it was cheaply made, and many proved unsatisfactory. It used a plunger-type sear arrangement, which required that it be well lubricated for proper functioning, which caused malfunctions in very cold weather.

The FN Deluxe action had the conventional M98 bolt sleeve, which was fitted with a very rugged low scope safety. The safety lever was to the left of the bolt sleeve and, when swung up, the safety locked both sear and bolt. I consider this a very convenient and reliable safety, and preferred it to any other safety ever made for the Mauser action. Most shooters, however, did not like this safety for one reason or another. The Supreme action has a low rounded bolt sleeve minus any provision for a safety, but with the safety built into the trigger mechanism. Early ones had a pivoting-type safety lever, later versions had a sliding-type lever; both had the

serrated button exposed above the stock line on the right of the receiver tang. With the safety to the rear, trigger and bolt would be locked. Because some intricate milling is required on the receiver and bolt for this safety, the No. 4 Sako trigger with the safety cannot be easily installed on the FN Deluxe or M98 actions.

FN Action Numbers

Below is a listing of the various numbers of the FN actions, as shown in the Firearms International catalog up to 1969:

Action No.	For Calibers	Magazine Length
1	30-06, 270, 7mm, 8mm, etc.	3 1/4"
2	308, 243, 244, etc.	2 1/4"
3	22-250, 250, 257	2 1/4"
4	220 S	2 1/4"
5	300, 375, MAG.	3 1/4"
BR No. 6	222"	—
BR No. 6	30-06"	—
BR No. 6	Magnum"	—
7	458, 338, 284, etc.	3 1/4"

*Supplied without trigger.

Note that all of these actions are the same length (8 1/4"), since all are based on the same receiver, and all are about the same weight (2 1/4 pounds). Below are some comments on the different action numbers:

No. 1: The standard or basic action, suitable for all cartridges of 30-06 head size and approximate length.

No. 2: Identical with the No. 1 except for a folded sheet metal spacer riveted in the rear of the magazine box, along with a shorter magazine follower and follower spring.

No. 3: Same action as No. 2 but with the spacer positioned further forward, shortening the magazine opening to 2.75".

No. 4: Like No. 2 and 3 actions except for a sheet metal spacer in the front of the magazine box, with both rear and front spacers angled slightly to the rear. Since the 220 Swift cartridge has a semi-rimmed head, this magazine generally prevented incorrect loading of the magazine so that the rim of one cartridge cannot easily override another.

No. 5: This is the FN Magnum action, the front of the magazine box lengthened and the feed ramp cut to accept the long, belted 300 H&H and 375 H&H Magnum cartridges, and with the bolt head and extractor made to handle the belted head magnum case. This is the action formerly used for the long Weatherby Magnum cartridges.

No. 6: This is the single shot Bench Rest action with solid-bottom receiver. The three differ only in bolt head and extractor. The first No. 6 was made for 222 Remington head-size cartridges. The second one was made with a bolt head and extractor to handle all 30-06

PART II: Commercial Rifles & Actions

The author's personal long range varmint rifle is based on the FN Deluxe No. 6 single shot benchrest action, with a No. 4 Sako trigger. The 25" medium-weight Douglas Supreme barrel, rifling twist 1:12" is chambered for the 244 Remington. The fine curly maple stock is fitted with a Niedner-type checkered steel buttplate and pistol grip cap. The scope is a Bausch & Lomb BalEIGHT with B&L mounts. This rifle weighs 11.5 pounds and is extremely accurate, even with factory 6mm 100-grain loads.



head-size cartridges. The last BR action is made to handle any of the belted head magnum or rimmed cartridges of equivalent rim size.

No. 7: Like the No. 1 except that the bolt head and extractor were made for the belted magnum cartridge.

As noted, the No. 5 is merely the regular FN action opened up to accept H&H Magnum cartridges. In opening the magazine well, part of the feed ramp is cut away. The metal in this area is vital in supporting the right (or lower) locking lug, and removing metal from this area weakens the support for the locking lug. How important this is will be examined.

Let us consider the following factors: 1) The upper (or left) locking lug on the M98 and FN bolt is deeply slotted for the ejector, with the result that it has less bearing surface against the receiver than the solid bottom (or right) locking lug. Being slotted, it is not nearly as strong as the bottom lug. 2) In standard FN actions (Nos. 1, 2, 3, 4 & 7) the upper locking recess gives a more massive support to its locking lug than does the lower locking recess to its locking lug because the lower shoulder is partly cut away to form the feed ramp. The result is that the weakest locking lug is more solidly supported by the receiver than the stronger lower locking lug. In the standard action, this support is more than adequate to hold the bolt securely in the receiver against the back thrust of firing the most powerful cartridges. 3) In the No. 5 FN action, considerable metal is cut away from the feed ramp to make room for the long magnum cartridges, which weakens the lower locking shoulder even more. Even so, there is still adequate support for the bolt with factory-loaded 300 H&H and 375 H&H Magnum cartridges, which normally develop less than 50,000 psi breech pressure. However, with the receiver so modified (and I would also say weakened), and the action used for some higher-pressure cartridge

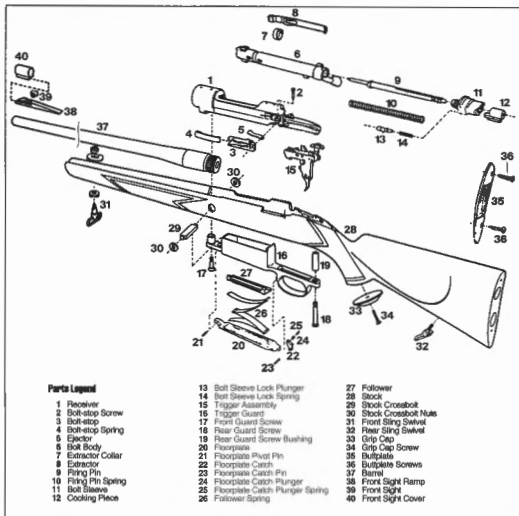
based on the long magnum case, the picture is different.

For example, I used a No. 5 FN action to build a rifle for the 300 H&H Improved Magnum, and the action failed. Its owner fired it quite a bit with heavy, but I do not think excessive, handloads. On a big game hunt he fired a shot at an elk, and then was unable to open the bolt. When he finally got the bolt open he found that the left half of the upper locking lug had cracked off. He wisely did not attempt to fire the rifle after that.

On careful examination of the rifle I concluded that the following took place: On firing the rifle a gradual bolt set-back occurred because of the locking lugs peening into the locking shoulders, and due, I believe, to the minimal support provided by the lower locking shoulder. As the peening quickly increased, the metal of the bottom locking shoulder was further weakened so that the top locking lug was doing most of the work. At this point, and on the final shot, the top lug cracked. Fortunately, the safety lug took over and prevented possible injury to the shooter—even, perhaps, had he fired another shot. However, the receiver and bolt were damaged beyond repair. After this experience, and being told of similar happenings with Weatherby rifles based on this action, I have concluded that the No. 5 FN action is suitable for factory-loaded 300 and 375 H&H Magnum cartridges, but not for hot Weatherby or similar wildcat cartridges. The FN No. 5 Magnum action was not a true "magnum" action, as was the Brevex Magnum, but merely a standard action modified to handle H&H Magnum cartridges. I believe the failure described was due entirely to weakening of the lower locking shoulder in the receiver when it was altered. This is also the reason I advise that the M98 military action not be modified in this manner for magnum cartridges too long for the original magazine.



Early-type FN Deluxe benchrest action open to show solid-bottom receiver and groove in forward tang of the trigger guard.



Additional Comments on No. 6

Illustrated nearby is an original Mauser Oberndorf target rifle chambered for the 8.15x46R cartridge. Known as the *Wehrmanngewehr* (serviceman's rifle), it is in most respects nearly identical to the regular M98 service rifle with the 29" barrel. It differs mainly in its chambering and single shot construction. Instead of opening the receiver bottom for the conventional magazine well, it was left solid. A shallow inclined groove milled in the top of this receiver bottom provides a cartridge loading chute.

Apparently many of these Mauser single shot rifles were brought back to the U.S. by returning GIs after WWII, and any knowledgeable shooter examining this rifle usually commented that here was "a real action for a varmint or target rifle." Because some shooters knew this, and because benchrest shooters were beefing up M98 actions for their use, Firearms International got the word, and shortly FN made up similar No. 6 actions.

I have a high regard for all of FN Mauser actions, but I have the highest regard for the No. 6. I believe it is the strongest Mauser action ever made because the bottom locking

lug has the solid support of that wall of steel which forms the receiver bottom. The solid bottom also makes this action very rigid and stiff. It has the strength to support a very heavy, full-floating barrel without the receiver bowing in the middle. The flat bottom receiver made inletting it into the stock less of a problem. If the shooter wanted this action held more securely in the stock than can be provided by the regular front and rear guard screws, an additional screw could be threaded into the receiver bottom.

I considered the FN No. 6 action ideal for building a long range varmint or target rifle,

PART II: Commercial Rifles & Actions



Some Mauser 98 rifles were made up for target shooting, chambered for the 8.15x46mm. This has long been a popular cartridge in Germany for target shooting. The rifle shown here was more or less a regular Model 98 military rifle except for the chambering. Some were made as repeaters while most seemed to have been made as single shots with a solid-bottom receiver. When made as a single shot, the bottom of the receiver was machined to leave an angled loading chute (below) so that a loaded cartridge could be dropped into the opened action, and on closing the bolt the cartridge would be directed into the chamber.



and top caliber choices for the former would be the 6mm Remington, 25-06 and 257 Weatherby Magnum; the best long range target calibers would be the 6.5x55 Swedish Mauser, 30-06 and 300 Magnum. Serious benchrest shooters say the No. 6 is not quite stiff enough for a "one holer" bench rifle, but for the shooter-held varmint or target rifle I don't believe it can be beaten.

This action, however, had one minor shortcoming. The inside bottom of the receiver is an unbroken, straight shallow groove matching the radius of the bolt. For more convenient loading I believe it should have been made with a shallow, inclined loading groove.

This action would also have been stronger if the following had been done: First, there is no need for an ejector, and with the ejector eliminated, the slot in the left locking lug could be omitted. This would make the No. 6 even stronger. Second, why wasn't the undercut eliminated in the bolt face recess and made a full diameter recess instead? This would have made the action safer.

Browning FN Action

Browning firearms were formerly made in the Fabrique Nationale plant in Liege, Belgium, the same plant that made FN actions. While separate Browning FN actions and barreled actions in the U.S. were never available, I will give a short description of this action because it is slightly different from the regular FN Supreme action.

Browning introduced their first high-power bolt-action rifles in 1960. They were cham-

bered for the 243, 270, 308, 30-06, 264 Magnum, 338 Magnum, 458 Magnum, 300 H&H Magnum and 375 H&H Magnum. A few new magnum calibers were added later, among them the 7mm, 300 and 308 Norma. All calibers were built on a modified version of the standard and magnum FN actions.

The Browning FN action was finely made and superbly finished, making it the smoothest working, best looking action based on the M98 design.

Except for two things—trigger and bolt-stop—the Browning FN action is just like, and had the same features as, the regular FN Mauser action. It has the large ring receiver, tapped for scope mounts. The collar inside of the receiver ring is divided, that is, notched out on both left and right sides. The bolt is identical with the FN bolt except the grasping ball is round. The magazine is the same, having a hinged floorplate, and either a steel or alloy follower.

The Browning FN action, trigger and bolt-stop are unlike those on the standard FN action. The trigger, more or less a copy of the Model 70 Winchester, has a sliding tang safety which locks both trigger and bolt when slid back. The trigger spring provides a let-off of about 3 to 3.5 pounds, very short and smooth. Only one adjustment is provided, a trigger stop screw which holds the trigger spring in place; this screw is normally adjusted correctly at the factory.

The Browning trigger is so well designed and made that no other adjustments are need-

ed. One could not ask for a finer, simpler, more reliable trigger.

The Browning FN bolt-stop is almost flush with the receiver, quite different from the regular Mauser bolt-stop box and ejector housing. On the Browning FN action, the bolt-stop and the ejector pivot together on a pin, these parts fitting into a hole and slot in the left receiver bridge wall. The bolt-stop and ejector are held in place and tensioned by a forked spring attached to the action by a stud mortised into the receiver wall. Depressing the flat serrated thumbpiece on the bolt-stop allows the bolt to be removed. This appears to be an excellent arrangement and, being nearly flush with the receiver, a desirable design feature. Neither the trigger/safety mechanism nor the bolt-stop/ejector are interchangeable with these parts in any other M98 or FN Mauser actions.

Browning FN actions are serial numbered on the right side of the receiver ring and under the bolt handle stem.

In 1971, separate Browning FN turnbolt rifle actions were not available in the U.S., but they were in Canada. I found them listed in Ellwood Epps' catalog (Orillia, Ontario, Canada) in the standard and short magnum calibers and in the long belted magnum calibers.

Today the FN Mauser action is no longer available. Browning and other arms makers who once used this action to build their high powered sporting rifles have switched to other makes of actions; Browning to their own action made in Japan (see the chapter on the Browning BBR Rifle).

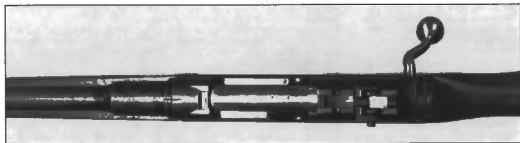


French Model 36 MAS Sporter

IN THE CHAPTER on French military turnbolts, I made a brief mention of the existence of sporting rifles based on the French Model 36 MAS action, and that I had never seen one and had hardly any information on them. However, I received a number of letters from readers in France and Africa confirming the fact that there actually were

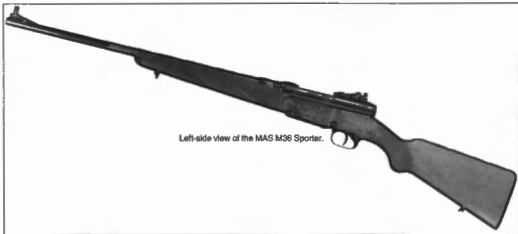
MAS M36 sporters. While these rifles might be rare elsewhere in the world, they were certainly not unknown on the European and African continents. One Paris gunsmith even went to the trouble of sending me some photocopies of his catalog which illustrated and described the different M36 sporters that he handled. Still another Frenchman

(Above) French MAS M36 Sporter as manufactured by Manufacture Nationale D'Armes, Saint Etienne, France. Its 22.6" barrel is chambered for the 7x54mm cartridge, very similar in size to the 284 Winchester. The rifle weighs 7.5 pounds and was made in 1947.



(Above) The top of the receiver ring and the rear sight base are machined to accept a quick-detachable scope mount. (Below) The MAS M36 Sporter has a pivoting wing safety mounted in the trigger guard behind the trigger. It is shown here in the Safe position; swinging it to the left with the tip of trigger finger disengages it from the trigger.





Left-side view of the MAS M36 Sporter.

sent me some negatives of a M36 sporter that he owned and had used when he lived in Africa.

Then I received a letter from a Florida man who had a MAS M36 sporter. "Would you like to see a factory produced MAS sporter?" he wrote in his letter, "or would you like to buy one?" Of course I would, I wrote back. I ended up buying it. It is this rifle that is shown and described here.

The rifle appears to be original in every detail, and appears to have been a regular model as opposed to a rifle built on a military action by a gunsmith.

The markings are as follows: On the right side of the receiver is stamped: **MANUFACTURE NATIONALE D'ARMES SAINT ETIENNE**. On the left side of the receiver is stamped: **CAL. 7 x 54 No. 91**. The caliber designation **CAL. 7 x 54** is also stamped on the bolt body. Below the breech end of the barrel and hidden by the forend is stamped: **MAS 1947**. The final positive marking is on the upper left side of the barrel breech as follows: **CAL. 7-54**. I found no definitive proofmarks on the action or barrel, no military serial numbers or other ordnance markings except a small marking here and there which I took to be manufacturing inspector stamps.

My MAS M36 sporter has a 22.6" round tapered barrel of light sporter weight. The front sight is an inverted V mounted on a ramp base that is pinned to a barrel band and sweated in place. The rear sight is the same as the military sight used on the MAS M36, an elevation-adjustable aperture sight graduated in meters.

The action appears to be identical to the military version except that the receiver

bridge and the rear sight base are machined for scope mounts, and the trigger guard has a built-in safety mechanism. I have not seen an illustration of the scope mounts made for this rifle, but the grooves and cuts machined on the receiver indicate a pair of rings with the front one having a base that clamps in the grooves on the receiver ring, the rear ring having a catch or clamp that engages the rear sight base (by which the scope can be quickly removed and replaced).

Both trigger guard and safety are entirely non-military. The trigger guard bow is neatly shaped and into it is built a pivoting wing safety. With the wing swung down, the safety blocks the trigger so that it cannot be pulled back. With the safety swung to the left, which is easily done with the tip of the trigger finger, the safety is disengaged from the trigger. It is a very positive arrangement.

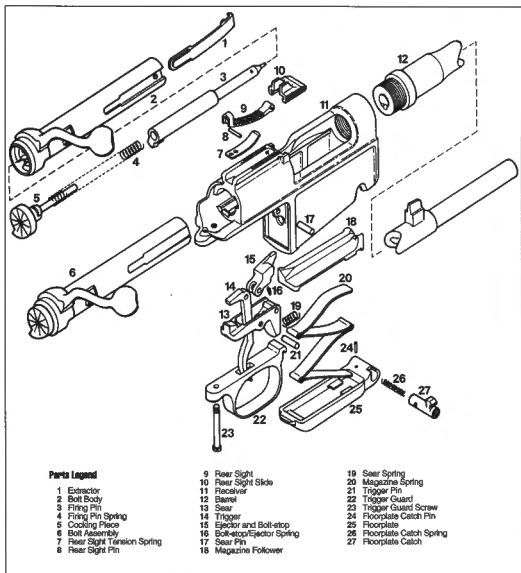
The wood of the stock and forend appears to be walnut and both are proportioned to the minimum side. The forend is slab-sided and no wider than the receiver. At the bottom it tapers from the receiver to the barrel. It is held to the barrel by the sling swivel screw which threads into a round stud dovetailed into the barrel. In addition to this fastening there is steel plate with a hooked end inletted and fastened in the bottom rear of the forend to engage in a recess in the receiver, and this arrangement prevents the forend from moving forward from the recoil of the rifle.

The buttstock has a short, round-ended pistol grip, thin comb and a well-proportioned composition shotgun-style buttplate. Both the stock and forend are checked. On my MAS M36 sporter, the bolt handle has

been rebent rearward, whereas in the illustrations in the French catalog the bolt handle is the same as on the military carbine; that is, it is bent forward. The barrel is of the same configuration, size, and length as the MAS M36 military barrel. The rifle weighs 7.5 pounds.

The caliber marking on the barrel appears to have been stamped on by hand, the letters and numbers are neither even nor of the same size, and a dash is used instead of an X between the numbers. The number 4 is also indistinct. At first I got the impression that perhaps an original 7.5-caliber military barrel had been used and the caliber marking of 7.5 altered to 7-54, and that the barrel may have been relined. However, close inspection reveals no evidence of any alteration of the marking and no positive signs of a barrel relining job. I therefore conclude that this rifle is a commercial manufactured one, perhaps the 91st one as indicated by the serial number, and that it was made in 1947.

I have been unable to find any good information on the 7x54 cartridge this rifle is chambered for. A chamber cast revealed that it is merely the French 7.5x54 MAS cartridge necked down to hold a 7mm bullet. As such, I would classify it as a French wildcat cartridge—the French gunsmiths made up wildcat cartridges just as American and Canadian gunsmiths did. However, in my research of other rifles and cartridges, I ran into some interesting bits of information. Philip B. Sharpe, in his book, *The Rifle in America*, writing about his work in developing the 7x61 Sharpe & Hart cartridge, mentions that his first choice of a cartridge case to use was a 7mm French



machinegun cartridge developed shortly after 1900. It had a case with a body diameter larger than the 30-06. Anyway, he dropped this case in favor of one based on the 300 Magnum belted case. I may not be correct in the following assumption, but it would seem logical that when the French developed the 7.5x54 cartridge they merely took their old 7mm machinegun round and

necked it up to 7.5mm caliber. And so the 7x54 cartridge may not be a wildcat at all, but merely the old 7mm machinegun cartridge revised. In any event, the 7x54 cartridge is almost the same as the 284 Winchester except that it has a regular rimless head rather than the rebated rimless head of the 284 Winchester.

The MAS M36 sporter is an interesting

rifle. Like the MAS M36 military it has a terrible trigger pull and poor trigger, trigger guard and pistol grip placement. It would have been a far better sporter had the French gunsmiths moved the trigger and trigger guard rearward three-quarters of an inch or so and then stocked it with a pistol grip properly placed and shaped for a comfortable hold.



Golden Eagle Model 7000

THE GOLDEN EAGLE Model 7000 turnbolt rifle is a Japanese-made import of which little is known. Very little has appeared in print concerning the origin and history of this rifle and my letters to the importer and U.S. distributor drew a blank. I do not know when it was introduced, who designed it, how many were made, or if it will ever be on the market again. From the little that I did uncover in print about this rifle, it seems it was introduced sometime in the mid-1970s and that the Houston, Texas, firm that distributed it failed in 1980 or about that time. What I did learn about the rifle I gleaned from advertising literature and from the rifle itself, which I had a chance to examine.

The Rifle

The Golden Eagle Model 7000 turnbolt rifle was made in the following calibers: 22-250, 243, 25-06, 270, 270 Weatherby Magnum, 7mm Remington Magnum, 30-06, 300 Winchester Magnum, 300 Weatherby Magnum, 338 Winchester Magnum, 375 H&H Magnum and 458 Winchester Magnum. Weight of the standard-caliber rifles averaged around 8.5 pounds with 24" barrel. It was also available with a 26" barrel. Weight of rifles in the magnum calibers averaged close to 10 pounds, and for the 458 a pound more. Only the M7000 in the 375 and 458 Magnum calibers were made with open sights, but all were drilled and tapped for scope mounts. The staggered-column magazine with hinged floorplate holds four cartridges in the standard calibers and three in the magnum calibers.

Fine quality American walnut was used for the stocks. They were made with Monte Carlo comb with cheekpiece, hand-cut checkering, flared pistol grip with a golden eagle inlaid in its cap, slanted forend tip of contrasting wood, quick-detachable sling swivel studs, ventilated rubber recoil pad, and a high-gloss finish. Although these rifles were well made and well appointed, they were on the

heavy side and proportioned for a large person with large hands.

The Action

The receiver of the Golden Eagle action appears to be machined from a piece of seamless steel tubing with a finished wall thickness of .300". The flat-faced barrel is threaded into the front of it with a heavy recoil lug fitted between the receiver and the barrel shoulder, as is done on the Remington Model 700 action. Machined in the upper right center of the receiver is an ample-sized ejection port, large enough to also be used as a loading port. Below that is the magazine well opening. The receiver bridge is unlotted on top. Below the bridge, the receiver is machined to accept the trigger mechanism and the short safety tang. The upper exposed part of the receiver is very gracefully contoured to improve the otherwise plain round appearance of the usual round-topped receiver, and to reduce its weight. The top of the receiver ring and bridge are drilled and tapped for scope mounts.

The bolt appears to be of one-piece construction with an integral low-profile bolt handle for low scope mounting. Similar in shape to that of the Winchester M70, the bolt handle is ample in length for good grasping and operation. On the rear of the bolt are five locking lugs in three evenly spaced segments around the bolt body. The inside of the receiver bridge is machined to accept these lugs and to provide locking shoulders for all. The root of the bolt handle serves as the sixth locking lug in an L-shaped slot in the right side of the receiver bridge.

The smooth front end of the bolt is recessed for the cartridge head. In the left edge of this recess is the spring-loaded plunger that is the ejector. The right side of the bolt head is machined to accept the extractor which is held in place, and pivots on, a pin and is tensioned by a spring. It rotates with the bolt as the action is opened and closed.

The bolt is drilled from the rear to accept the one-piece firing pin. The rear end of the bolt is also threaded to accept the bolt sleeve and is notched for the cocking cam on the firing pin head. Except for a small test on the bottom rear of the firing pin head, the bolt sleeve encloses the entire head. There is no bolt sleeve lock, but the mainspring is of such heavy tension, and combined with the cocking cam in the shallow bolt-open notch, the bolt sleeve is not easily turned.

The firing pin is threaded into the firing pin head. The coil mainspring is compressed between a shoulder on the front of the firing pin and the bolt sleeve. To prevent the firing pin from turning, which would affect the amount of tip protrusion, there is a small stud threaded into the firing pin with its head end moving in a slot cut into the threaded front end of the bolt sleeve.

Three gas vent holes are provided in the right side of the bolt body to allow gases to escape through the ejection port, should any ever enter the bolt through the firing pin tip hole.

The Golden Eagle action is fitted with a trigger mechanism not too unlike that of the Timney trigger. Trigger and sear (along with the pins, set-screws, and springs to hold these parts in place and to make the mechanism function) are housed in a steel box which is in turn fitted into a slot in the bottom of the receiver; it's held in place by a pin and tightened by two small screws. The bolt-stop is also part of the trigger mechanism with its own pin and spring and is linked to the trigger to activate it. There is only one adjustment screw for the trigger, located in front of the lower part of the housing. Turning it counter-

(Above) The Golden Eagle Model 7000 Deluxe turnbolt rifle.

clockwise lightens the trigger pull. The trigger pull is short and crisp.

The sliding tang safety is on a short separate tang on the rear of the receiver and is linked with a bar to a rotary safety block through the housing directly in front of the trigger. It blocks only the trigger. A lengthwise groove in the bolt is provided for the bolt-stop, the length of the groove depending on the length of the cartridge for which the rifle is chambered.

The trigger guard is made of a lightweight alloy and to it is hinged the thin stamped floorplate. The magazine box fits between the trigger guard and the receiver and is made of thin sheet metal. A cartridge guide or feed plate is fastened in the front end of the box. An L-shaped plate is fastened in the rear of the box and is located to make the magazine box opening the correct length for the cartridge the rifle is chambered for. The follower and the follower spring are also made to correspond with the magazine length. The latch to hold the floorplate closed is mounted in the top front of the trigger guard bow.

Two slotted-head guard screws through the ends of the trigger guard and threaded into the receiver, hold the barreled action securely in the stock.

Comments

My comments will be mostly about the action of the Golden Eagle rather than the entire rifle. The action has been well thought out and designed—it is strong and safe and I believe it was designed specifically to handle any of the belted magnum cartridges, including the older ones such as the 375 H&H Magnum. The receiver, bolt and the magazine all seem to bear this out.

It is a magnum action throughout. The designers did a good job of adapting it to handle smaller cartridges such as the 22-250, but

it was something on the order of what Winchester once did when they adapted their Model 54 and Model 70 actions to handle the 22 Hornet.

There are many good features in the Golden Eagle action which I like. The locking lug arrangement is good. I especially like the bolt handle. With no locking lug raceway the length of the receiver, the front end of the bolt effectively seals the breech when the action is

closed. There is adequate provision for venting powder gases in the event of a primer or case head failure. The bolt sleeve design for sealing the rear of the receiver is very good. I like the design and arrangement of the firing pin and cocking cam, and I especially admire the contouring done on the upper half of the receiver. I do not see too much to criticize about the trigger and bolt-stop mechanism, although I believe a larger diameter pin



The Golden Eagle M7000 action. Long and large enough to handle big bore magnum cartridges, it was also adapted to handle most standard rimfire cartridges from the 22-250 on up.



Left side of the M7000 action.



The M7000 action, open. This particular action has a short magazine box adapted for the 22-250 cartridge.

PART II: Commercial Rifles & Actions



The M7000 trigger mechanism. Arrow shows location of trigger adjustment screw.

should have been used to hold the mechanism in place. The safety, however, can certainly be improved. The safety button is much too small and the safety should block the sear rather than the trigger. There is also no bolt lock. I see nothing wrong with the magazine box, follower, follower spring or the method used to shorten these parts for short cartridges, but the sheet steel floorplate seems out of place on a fine rifle. The sharp squared-off front end of the floorplate bothers me and it will bother others.

A few comments on the rifle itself. As mentioned above, the Golden Eagle action is large with a magazine designed for a magnum cartridge, wide and deep. Even with the standard lightweight sporter barrel on this action, it is difficult to stick the barreled action to end up with a lightweight hunting rifle, or even a

medium-weight one. The rifle shown here weighs exactly 8.5 pounds, and scoped, slinged, and loaded, it would come close to 11 pounds. That is a he-man's rifle. In addition, because the action is so wide and deep, the rifle has a large over-the-action girth, and in turn this means that the forend starts out large. Anyway, to make it all come out to look right the end result was a he-man's stock, one ideally suited for a large man with large hands. Like the action, it's a stock for a magnum caliber.

The 22-250 is one of the finest varmint cartridges around, but it is out of place in the large Golden Eagle action; so is the 243. Based on my own experience there is no varmint rifle design of action, barrel and stock for the 22-250 cartridge more ideal than the Ruger M77V. This rifle has less wood than the Golden Eagle, and that is the way I think it should be.

The Golden Eagle is a fine looking rifle and a very husky one, made for a husky caliber and a husky hunter.

Takedown and Reassembly

Make sure the chamber and the magazine are empty. To remove the bolt, pull the trigger back as far as it will go and then open the bolt and remove it. To disassemble the bolt, proceed as follows: Using a piece of hard wood as a spatula in one hand, and the bolt grasped firmly in the other, force the cocking cam back away from the bolt and at the same time unscrew the bolt sleeve counterclockwise. Keep on doing this until the bolt sleeve separates from the bolt. To disassemble the bolt sleeve from the firing pin, remove the small screw from the slot in the bolt sleeve

threads and unscrew the firing pin from the cocking cam. Be careful here as the main-spring is quite powerful. Reassemble in reverse order.

Disassembling the firing pin parts is not recommended for any purpose except to replace broken parts, because reassembling and obtaining the correct firing pin protrusion is difficult.

To remove the stock from the barrel and receiver, unscrew the front and rear guard screws, lift the barrel and receiver out of the stock and remove the trigger guard assembly. The trigger mechanism can be removed from the receiver by loosening the two set-screws in the front of the trigger housing and driving out the small pin just behind them. Do not attempt to disassemble the trigger mechanism unless necessary, and unless you know for sure what you are doing. Reassemble in reverse order.

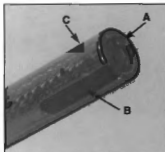
The barrel is screwed very tightly into the receiver and unless you have the proper equipment for this job, do not attempt to remove it.

Markings

The Golden Eagle rifle as made by Nikko in Japan is marked as follows: On the left receiver wall is stamped in bold lettering the name: **GOLDEN EAGLE**. On the right side of the receiver ring is:

U.S. PAT. 4005540
MADE IN JAPAN
BY NIKKO

On the right side of the barrel breech is:
**GOLDEN EAGLE
FIREARMS
HOUSTON, TEXAS**



Bolt head of the Golden Eagle rifle showing: (A) ejector, (B) extractor, and (C) one of the gas vent holes.



The serial number is stamped on the left side of the receiver ring. The same number is also found under the bolt handle and barrel. On left side of barrel breech:

MODEL 7000
(caliber)

Conclusion

I may be wrong in this assumption, but the thought occurred to me that the designer of the Golden Eagle M7000 action and rifle was influenced by the Schultz & Larson M68DL because of several major similarities in the design. The size, weight and general style of both rifles are very similar. So is the size and construction of the receiver, bolt, magazine and the locking lug arrangement. Here and there on these parts the designer changed things so that he wasn't exactly copying, things such making the bolt with five locking lugs 120 degrees apart, rather than four as on the S&L bolt. The designer also adopted and adapted some features of other turnbolt actions such as the recoil lug and bolt-stop arrangements.

Although at a casual glance the M7000 action in a stock looks very much the same as the Schultz & Larson M68, it differs greatly in minor design and construction details. Inside, the action of the M7000 also differs in the workmanship, in the manufacture and the finishing of the parts as compared to the high



quality of work done in making the S&L action. Nikko also took manufacturing shortcuts. For example, the locking lugs on the S&L bolt are finished off on top to the same radius as the locking recesses in the receiver, and the raceways for them are made the same way. The locking lug raceways in the M7000 receiver seem to have been machined with an end mill of less than $\frac{7}{16}$ " diameter and the tops of the locking lugs made to the same radius, using the easy and quick way of performing this operation. Even with four lugs instead of five, the locking lugs in the S&L action are the stronger.

In my comments about the Schultz & Larson action in another chapter, I stated that although this action was well made and strong,

I also thought it was too bulky to be ideal for any of the standard rimless cartridges, and that if it was large and strong enough to handle the Weatherby super magnum cartridges then it was needlessly large for smaller ones. The same is true in regard to the Golden Eagle M7000 action, for it seems to me that for a hunting rifle there is too much action. I can't but help admire the way Sako handles this problem—by making three lengths of actions: a short one for the 222 family, a medium one for the 308 family and a long one for the 30-06 and the belted magnum family.

I have no information as to when the Golden Eagle rifle was discontinued, but I have not run across any since about the mid-1980s.

Dimensional Action Specifications

Receiver length	8.750"
Receiver diameter	1.360"
Bolt diameter	.740"
Bolt travel (22-250)	3.625"
Striker travel	.300"
Magazine well length	3.350"
Bolt face recess:	
Depth	.120"
Diameter (30-06 head size)	.475"
(belted magnum head size)	.540"

General Specifications

Type	Bolt-action repeater.
Receiver	Round one-piece machined steel, unslotted bridge, recoil lug a separate part held between barrel and receiver.
Bolt	One-piece construction, five locking lugs in three segments on rear of bolt, bolt handle serves as the sixth lug.
Ignition	One-piece firing pin, coil mainspring, cocks on opening the bolt, 60-degree bolt lift.
Magazine	Non-detachable, staggered-column hinged floorplate.
Trigger	Single stage, adjustable.
Safety	Sliding tang safety locks trigger mechanism.
Extractor	Pivoting hook in bolt head, rotates with bolt.
Ejector	Plunger-type in bolt face recess.
Bolt-stop	Bolt-stop is part of trigger mechanism and released by pulling the trigger.
Manufacturer	Nikko in Japan.



Herter's Plinker Rifle

THE LITTLE 22 Hornet cartridge has been around since about 1931. During the 1930s and 40s it was a very popular cartridge, and several American and foreign rifles were chambered for it. Then along came the 222 Remington in 1950, which created such a stir among varmint shooters that the 22 Hornet was all but forgotten. One by one the American-made 22 Hornet rifles disappeared, including the 54, 70 and 43 Winchester and the Savage 23D, 19H, 417, 417½, 340 and 219. By 1967 no American-made Hornet rifles were available. The availability of foreign rifles in 22 Hornet caliber was somewhat sporadic but, except during WWII years, it was always possible throughout most of this period to obtain a 22 Hornet by one means or another. Of the foreign-made bolt action 22 Hornet rifles there were two Stoeger imports, the Krico, Brno, Walther, Anschutz, Sako and several lesser-known makes.

For a few years the Krico Hornet and the original Sako Hornet actions were available. The Krico 22 Hornet rifle was last offered by Stoeger in 1959. Incidentally, the Tradewinds Model 600 action described in another chapter is an offspring of this Krico action. Since then it has reappeared on the American market (1993) as a Krico Model 400.

I now refer you to the No. 956 Precision Hornet Rifle, from Stoeger's 1934 *Shooter's Bible*. Most knowledgeable arms students can tell at a glance that this was not much of a rifle, and the description of it will fool only a few. In all the years since this rifle was first listed I have seen only one of them, and I can tell you it was a toy. It was no more than a very light boy's rifle, of the type commonly used for 22 rimfire cartridges, merely made over to accept the 22 Hornet cartridge. This brings us to Herter's Model Plinker rifle, the main topic of

this chapter, for it, too, is a "toy" rifle, in my opinion.

During the many years I did rifle-barrel and chambering work I turned down numerous jobs of rebarreling and/or rechambering 22 rimfire rifles to the 22 Hornet or some other 22 centerfire cartridge. Many more were the letters I received asking questions about whether or not this or that low-cost 22 bolt action rifle or action was suitable for the Hornet. My reply was almost always a negative one. I don't know just how well Stoeger's No. 956 Precision Hornet rifle stood up, but I have serious doubts about Herter's Plinker.

For example, if I were asked if a Model D Page-Lewis single shot bolt-action rifle would be suitable for rechambering to the 22 Hornet, my answer would be a positive "No." Yet that is just about what the maker of the Plinker did—use a very weak 22 rimfire action and build Hornet rifles on it. Not only did they use such an action for the 22 Hornet, but for the 222 cartridge as well! Having got a number of letters inquiring about Herter's Model Plinker rifle, I grew curious about it myself. To find out what sort of rifle it is I ordered one, and here it is.

Herter's 22 Hornet Rifle

Listed in Herter's 1970 catalog as the Model Plinker, this is a single shot turnbolt rifle, listed as being available in 22 Hornet or 222 caliber. The rifle I received, in the 22 Hornet caliber, weighs about 4.3 pounds and has a 21" barrel. The six-groove barrel has a twist of one turn in 16", the groove diameter .223". The barrel, about .630" in diameter, is not tapered. It is held in the round receiver by a single small cross-pin. This is definitely not the way to attach a barrel to a receiver of the 22 Hornet or similar cartridge, unless the barrel is a shrink fit into the receiver. The

simple blade front sight, dovetailed into the barrel, is adjustable for elevation. The receiver top is grooved for common tip-off scope mounts.

The hardwood stock is stained dark, the inletting done by machine. The barrel and action are held in the stock by a single screw threading into the bottom of the receiver ring. The stock, which has no buttplate, is deeply grooved. It has a full pistol grip and a comb raised so high that it is about impossible to get one's face down low enough to use the open sights. The stock is sanded smooth and given a glossy finish.

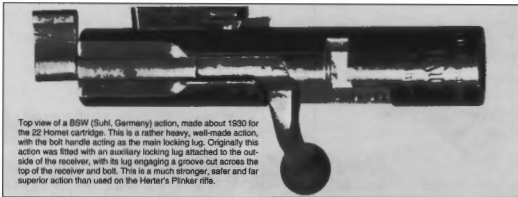
The letters LUX, within a diamond, are stamped on the receiver ring. The caliber designation and serial number are stamped on the barrel just forward of the receiver. The words MADE IN GERMANY (in small letters and lightly imprinted) are stamped on the left side of the receiver ring. There are no less than three proofmarks on the barrel and receiver!

The Plinker Action

The receiver, .865" in diameter, is about 5" long. A 1.5" opening in top of the receiver gives access to the chamber.

The one-piece bolt, .587" in diameter, is recessed for the cartridge head. The bolt handle, which has a bent-down stem and a round grasping ball, fits into a hole in the rear of the bolt. The right rear side of the receiver has an L-shaped slot for the bolt handle to pass and lock into, when the bolt handle is turned down. The back of the slightly enlarged base of the bolt handle is filed flat.

(Above) The German-made Herter's Plinker rifle was made in 22 Hornet or 222 calibers. Shown fitted with a Savage variable scope.



Top view of a BSW (Suhl, Germany) action, made about 1930 for the 22 Hornet cartridge. This is a rather heavy, well-made action, with the bolt handle acting as the main locking lug. Originally this action was fitted with an auxiliary locking lug attached to the outside of the receiver, with its lug engaging a groove cut across the top of the receiver and bolt. This is a much stronger, safer and far superior action than used on the Herter's Plinker rifle.

this becoming the locking surface against a locking notch in the thin-walled (about .160" thick) receiver. This locking notch is not very deep, but the bolt handle in this notch is the only thing that locks and holds the bolt in the receiver when the rifle is fired. Neither bolt handle nor receiver are hardened; a file easily cut both parts.

The bolt body, open from the rear, takes the one-piece firing pin and its coil mainspring. A bushing threaded into the rear of the bolt compresses the mainspring and holds the firing pin in place. The cocking piece, which fits onto the rear end of the firing pin stem (projecting to the rear of the bolt) is held by a pin. A stud fitting into the side of the cocking piece, which moves in the bolt handle slot, provides a means to place the rifle on Safe when the action is cocked. This is done by turning the stud up to engage a shallow notch in the rear of the receiver. The sliding type extractor fits into a slot cut lengthwise in the bottom of the receiver. Its front end half-encircles the cartridge head. The rear end of the extractor, bent upward to engage a groove in the bottom of the bolt, is thus pulled back when the bolt is opened. This type of extractor is found in several different foreign-made 22 rimfire rifles, as well as in the long-obsolete Page-Lewis Model D and Winchester Model 67 rimfire rifles. I don't know how the 222 extractor is made in this rifle, but it probably has a narrow hook which snaps into the extractor groove in the rimless cartridge head.

As in the Page-Lewis rifle, the sear is a long spring fastened to the bottom of the receiver ring by a screw. The trigger is pivoted on the rear end of this spring on a pin. The extractor is normally held in place by this spring. Two projections on this spring extend into the boltway, one forming the sear, the other the bolt-stop. When the bolt is closed the rear projection engages forward of

the cocking piece, and holds it back as the bolt is moved forward and locked. The trigger has a two-stage let-off, the last stage quite short and light.

The trigger guard is a steel stamping screwed to the bottom of the stock.

Comments

I don't think much of this rifle. Whether it is safe to use remains to be seen. I've already mentioned some very poor features and weak points, such as the pinned-in barrel, the soft thin-walled receiver, and a bolt handle which provides the only locking lug to hold the bolt closed, but there are more. For example, the trigger can be pulled at any time, even if the bolt handle is only very slightly down. The locking notch is not very deep at best and there is nothing to prevent this rifle from being fired even if the bolt handle is not fully closed. More on this later. Also, with the bolt open, if the rifle is held upside-down and the trigger pulled back, the extractor will fall out. Furthermore, when the bolt is removed the extractor is free to fall out.

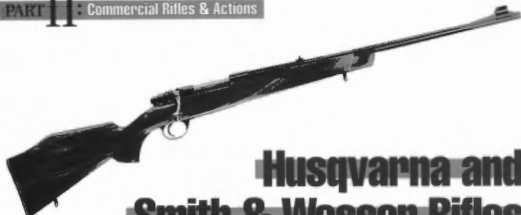
The Model 23D Savage, while not having a hardened-steel receiver, nevertheless had two large locking lugs to hold the bolt closed. Yet if this rifle was fired a lot it gradually developed headspace through wear and set-back of the bolt in the receiver.

The Model 43 Winchester receiver was hardened, and its bolt also had twin locking surfaces, but in spite of this, if the rifle was fired a great deal it too would develop excess headspace. I have always considered these two bolt actions as about the minimum for cartridges like the 22 Hornet. However, they had enough of a built-in margin of safety so that they were still usually safe to fire even with considerable excess headspace. I also consider the Model 1922 M-1 and M-2 Springfield actions as being on the minimal side, yet with a marginal safety factor when

converted to the 22 Hornet. At least these rifles could not be fired unless the bolt was locked sufficiently to hold it closed upon firing. Compare these three actions with Herter's Plinker action and it is predictable what is going to happen when the Plinker is fired to any extent. In my opinion the Plinker is an unsafe rifle, in 22 Hornet or 222 caliber, and I never recommended it.

Fortunately the bolt in my Plinker rifle locked up very tightly, and some effort was required to fully lower the bolt handle. How long it will remain tight is another question, but I've seen many 22 rimfire rifles, with stronger actions than this one, wear and loosen up to the point where they were positively unsafe to fire. While the action of my Plinker Hornet rifle was still tight my son took it out for a limited range test. I decided against firing factory ammunition in it, but used handloads consisting of 8 grains of #2400 powder behind the 45-grain, .223" Sierra Hornet bullets. This is a moderate load which I've found to be very accurate in a number of different rifles. Using a 4x Weaver B4 scope, and shooting from a rest, the first five shots, after five sighting-in shots, grouped within 1.7" at fifty yards. This surprised us. Taking suitable precautions we fired one shot with the bolt handle only halfway down, and the bolt remained in that position. After the shallow locking notch becomes worn, and it surely will if the rifle is fired a few hundred times, firing this rifle with the bolt only half-locked might prove disastrous.

Fortunately the Herter's Plinker has long been off the market. One reason is that the Herter's firm went out of business in the late '70s or early '80s. Anyway, if you have a Herter's Plinker rifle, do not fire it, and if you know of anyone else who has one, tell him the same thing. The main reason I have included this rifle in this book is to sound that warning.



Husqvarna and Smith & Wesson Rifles

TRADEWINDS, INC., BEGAN to import the Husqvarna centerfire turnbolt rifle action about 1954. Made in Sweden by Husqvarna Vapenfabriks Aktiefbolag (HVA for short) in Sweden it is a modified Mauser-type action with forward dual locking lugs on the bolt and a staggered-column box magazine with a hinged floorplate.

Tradewinds once imported and sold the HVA barreled actions and complete HVA sporting rifles.

The complete line of HVA rifles range from the lowest priced Husky to the highest engraved Presentation Grade. These, and their other grades were fine rifles in every sense of the word, and were good values. All have HVA Swedish-made "cold-hammered" barrels.

The HVA has a low-profile bolt handle and a sliding tang safety, both out of the way of a low-mounted scope. The bolt-stop is built almost entirely within the receiver. The action is trim, light in weight, clean in outline and smooth in operation. It has proved to be amply strong and safe for the cartridges for which the rifles were chambered.

The Early HVA Action

Until the early 1960s the HVA action differed somewhat in minor details from the later HVA action. Illustrated here is an early HVA action which I received in 1955 and on which I later built a very light big game rifle in 270-caliber. Because this action is no longer made, I'll describe it only briefly.

The markings on the early HVA include the Husqvarna crown trademark and the word SWEDEN stamped on the top of the receiver ring. The serial number, proofmark and the word NITRO are stamped on the flat on the bottom of the receiver ring.

The trigger guard/magazine assembly was made entirely of steel. The trigger guard bow is part of a magazine plate, and into its mag-

azine hole a sheet-metal magazine box is fitted. Spot welded to the plate in six places, the magazine box is 3.385" long. Two HVA actions were then listed by Tradewinds; No. 1 was made for the 257 Roberts, 7mm Mauser and 30-06 length cartridges. No. 2 for the shorter 308 family of cartridges. The latter is identical to the No. 1, including action length and magazine length, but the magazine box was made with ribs inside it to hold the shorter cartridges in the rear of the box.

The hinged floorplate latch was a bent, flat-spring affair fitted into the upper front part of the trigger bow. This all-steel action weighs about 44 ounces.

I don't know just when the change from the steel trigger guard/magazine to the alloy assembly was made, but except for this difference, the following description of the HVA action applies to the early action as well.

The Late HVA Action

I imagine the Husqvarna action was made of the finest quality, Swedish steel available for the purpose, with all components properly heat treated. The receiver is slim and smooth in outline, yet ruggedly made. Receiver ring is 1.290" in diameter and 1.750" long. The high and unnotched left wall and the lower right receiver wall extend straight back from the receiver where they connect with the 1.225" long bridge, leaving a receiver opening of slightly over 3". The bridge is the same width as the ring, thus the entire left side of the receiver is straight and of the same radius. The top of the bridge is lower than the ring, the general shape and contour the same as the modern FN Mauser action. The receiver ends in a narrow tang, which gives it an overall length of 8.750".

The part of the receiver which shows above the stock line is smoothly and evenly polished. The top of the receiver ring and

bridge each have two 6x48 tapped holes for standard scope mounting, plus two 6x48 tapped holes in the right side of the bridge for receiver sight attachment. All of these holes are fitted with plug screws, these having been turned in before the receiver was polished.

The bottom of the receiver is flat except for about .425" at the front of the ring. This flat spot, as well as the heavy recoil lug under the ring, is 1.10" wide. The recoil lug, about .325" deep, has enough area to prevent recoil from setting the action back into the stock provided it is bedded into the stock properly.

The front end of the ring is threaded to accept the barrel shank. There is no inside collar in the ring such as the M98 Mauser action has, so the barrel requires a reinforced shoulder to abut against the front of the ring to hold it tightly in place. The breech face of the barrel is flat. Barrel shank specifications are nominally: length, .615"; pitch, V-type, 12 per inch; diameter, .988".

The bolt is of one-piece construction, with the bolt handle made as an integral part of it. The bolt handle has a round, tapered stem curved slightly back and out, and ending in a round grasping ball. It has a very low profile so that it will clear the eye-piece of the lowest mounted scope.

On the extreme forward end of the bolt are two dual-opposed locking lugs. When the bolt is closed these lugs engage behind heavy shoulders within the rear of the receiver ring, securely locking the bolt. The left (top) locking lug, larger than the right lug, extends forward of the face of the bolt to nearly contact the breech end of the barrel when the action is closed. Neither lug is slotted. The face of the

(Above) HVA Imperial Custom sporting rifle.

bolt is recessed for the cartridge rim, but this recess is undercut at the bottom as in the M98 Mauser bolt. This allows the head of the cartridge to slip under the extractor hook, on feeding a cartridge from the magazine, to prevent double loading.

As on the M98 bolt, the HVA has an auxiliary, or safety, locking lug on the rear of the bolt body which engages in, but does not bear against, a recess in the bottom of the receiver bridge.

There is a 2.3" long rib on the center of the bolt body and a matching groove under the top of the bridge. This rib guides the bolt as it is operated and prevents the bolt from binding. The extractor is a conventional M98 type, attached to the bolt by a collar in a groove around the bolt. A lip under the front end of the extractor fits in a groove in the bolt head, which prevents longitudinal movement of the extractor. The front of the extractor hook is flat, and quite thin like that of the regular M98 extractor. The surface on the edge of the hook is not angled enough to allow the extractor to snap easily over the rim of a cartridge pushed into the chamber. Like the M98, the HVA action is designed for magazine-fed cartridges.

Initial extraction camming power is obtained by the base of the bolt handle moving across an inclined surface on the rear of the bridge, forcing the bolt and extractor back as the bolt handle is raised. Similar inclined surfaces on the approaches to the locking shoulders in the receiver ring also force the bolt forward as the bolt handle is lowered.

The bolt sleeve threads into the open rear of the bolt. The coil mainspring is compressed between a forward collar on the one-piece firing pin and the bolt sleeve; the rear



Original HVA action with all-steel trigger guard/magazine and spring latch for the hinged magazine floorplate.

end of the firing pin is held in place in the bolt sleeve by the cocking piece, which is secured to the firing pin by an interrupted lug arrangement.

The firing pin has a flattened rear section, which rides in a matching hole in the bolt sleeve; this prevents the firing pin from rotating. A spring-tensioned, plunger-type bolt sleeve lock fits into the left side of the bolt sleeve, and when the bolt is opened, the end of this plunger slips into a notch in the rear end of the bolt. This prevents the bolt sleeve from turning when the bolt is open.

Like the 98 Mauser bolt, the rear end of the HVA bolt is enlarged to provide thicker metal for the cocking cam notch. The action is cocked on the uplift of the bolt handle.

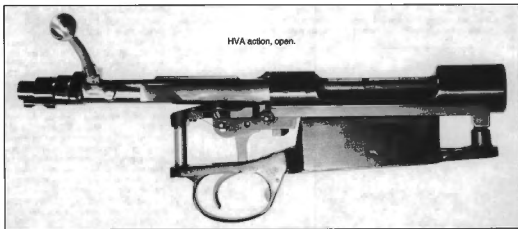
The trigger mechanism is similar to the conventional military two-hump M98 system, but has only one hump, resulting in a single-stage pull. The sear, positioned under the

receiver and pivoting on a pin, is tensioned by a coil spring. A projection on the rear end of the sear protrudes through a hole into the cocking cam raceway to contact the cocking piece as the bolt is operated. The trigger pivots on a pin through the sear. The trigger is grooved.

Trigger pull weight is about 5.5 pounds. No adjustment is provided.

The sliding serrated tang safety, at the right side of the tang, is a piece of thin steel fitted along the right side of the sear. There is a groove cut into the bottom of the receiver into which the higher front end of the safety moves, and which projects into the safety locking lug recess.

The safety slides on the sear pin and a screw in oblong holes, and is provided On and Off tension by a small spring screwed to the underside of the tang and bearing on a small pin in the safety. A pin through the



PART II: Commercial Rifles & Actions



HVA action.

rear end of the sear projects in an L-shaped slot in the safety. With the action closed and cocked, pulling back on the safety locks both sear and bolt. Pushing the safety forward, exposing the red dot on the rear of the tang, unlocks the sear and bolt. The safety can be put On when the action is closed and uncocked, but then only the bolt is locked. The safety is conveniently placed and easy to use. There is no need for an unsightly notch cut into the stock to accommodate the safety. It makes hardly any noise when it is moved from the On to the Off (forward) position.

The bolt-stop (combined with the ejector) is a thin piece of metal lying in a groove in the left underside of the bridge. It is tensioned and partially held in place by a flat spring screwed to the receiver, with the bolt-stop also pivoting on this screw. A serrated button on the bolt-stop projects from the receiver. By depressing this button when the bolt handle is raised, the bolt can be withdrawn. Quite inconspicuous, this button does not stick out far enough on a slim-stocked rifle to snag on clothing or brush.

The front part of the bolt-stop, which projects into the receiver, has two saw-toothed

projections; the front one is the ejector, the other the tooth which stops the bolt.

Two slots are cut into the bolt head; the front slot is cut into the bolt face so the ejector tooth can tip the cartridge case or cartridge up and to the right, out of the action, when the bolt is opened. The rear slot ends in the single gas-vent hole in the bolt. The bolt is stopped when the rear bolt-stop tooth contacts this hole.

There is only one gas-escape vent hole in the bolt, and none in the receiver. This hole is located about $\frac{1}{2}$ " back from the bolt face, and when the bolt is closed and locked, the hole is positioned to direct the gases into the left locking lug raceway. The left side of the bolt sleeve, flush with the outside of the receiver, would deflect any powder gases outward should any get this far back.

The one-piece magazine box/trigger guard unit is cast in a lightweight alloy, as is the magazine floorplate. Those alloy parts which show are well polished, and the whole unit is anodized black. The floorplate, hinged to the front of the trigger guard on a pin, is released by a spring-loaded lever built into the top front of the guard bow.

One end of the conventional W-shaped follower spring fits into a mortise in the floor-

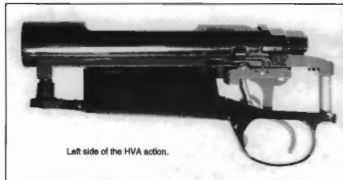
plate, the other end in a mortise in the bottom of the machined steel follower. A ridge on the left side of the follower staggers the cartridges in the magazine box. The top of the magazine box fits flush with the bottom of the flat-bottomed receiver. The magazine-well opening has integral cartridge guide ribs on each side. The usual ramp in the front of the magazine-well opening guides cartridges into the chamber when they are fed from the magazine by the bolt.

Three HVA actions were available: The 501 was for 30-06 length and head-size cartridges, the 502 is for 308 and similar-length and head-size cartridges, and the 503 for belted magnums of 30-06 length. Thus the 501 and 502 are identical except for construction of the magazine walls, and the 501 and 503 are alike except for differences in the bolt-face recess and extractor. All three have magazine boxes of the same length (3.385" inside opening). The No. 502 magazine-box side walls are thicker in front than at the back, and the step-down or ridge left provides a shoulder stop to hold cartridges rearward in the magazine. The shoulder is placed correctly for cartridges of about 243 and 308 body length.

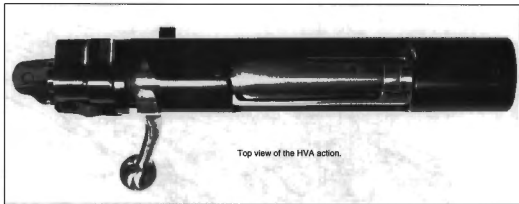
Two sturdy guard screws, through the front and rear ends of the trigger guard/magazine, hold the action securely in the stock. The front guard screw passes through an integral lug on the tang of the trigger guard/magazine. The top of this lug is recessed to fit over a small round stud on the bottom of the recoil lug. This aligns the guard with the receiver. A bushing for the rear guard screw, furnished with HVA actions, is used in the rifles made up by Husqvarna.

Comments

Since the HVA action was first introduced into the U.S. it has been advertised as the "HVA Improved Mauser" and as, "The only improved Mauser action designed for lightweight rifles. World famous Swedish steel makes possible an action that is stronger in construction, yet lighter in weight than other Mauser actions." The newly introduced S&W high powered rifle is also built on the HVA action just described. In the S&W advertising describing this action can be read, among other statements, the following: "...possesses a number of advantages over designs of the military Mauser type...The striker travel is only half that of rifles of the military Mauser type," and, "...to cope with the high gas pressures produced by modern ammunition—up to about 50,000 lbs./square inch, as against the former maximum of about 40,000 lbs..." Anyone knowing anything at all about the Mauser system would assume they're referring to the M98 Mauser. I don't think they were. Here's why.



Left side of the HVA action.



Top view of the HVA action.

There are only two large arms makers in Sweden: the commercial Husqvarna firm, making the HVA and other firearms, and the Swedish government arsenal, the Carl Gustafs Gevaersfaktori in Eskilstuna. Husqvarna had made up some rifles on the M98 Mauser action obtained from FN in Belgium, and they'd also made some sporting rifles on the Swedish M96 Mauser action. However, the Carl Gustafs factory—the "Springfield Armory" of Sweden—manufactured many thousands of Mauser military rifles for a period of around fifty years.

The "Mauser" rifles produced at Eskilstuna were the Swedish M94 Mauser carbines and M96 Mauser rifles. Of the original Mauser turnbolt systems, the M98 is without question the best one, but in Sweden it is natural to expect that a "Mauser" there is one they made and used during World Wars I and II, which are the Models 94 and 96. This is borne out by the statement above about the striker travel. The S&W rifles made by Husqvarna have the same actions as the HVA described previously, and their striker travel of .500" is the same as that of the M98 Mauser. This is exactly half that of the M96 Swedish Mauser action. Thus, the HVA advertising references to "improved Mauser" means "improved" over the M94 and M96 actions, not over the M98.

Now the M94 and M96 Swedish actions are good and, for a military action, they are extremely well-made and finished. They are certainly strong enough and safe enough to be used with cartridges developing up to about 45,000 psi breech pressure. For details of this action read the chapter entitled "Mauser Models 92, 93, 94, 95 & 96" in this book.

Let's see what HVA copied from the M96 Swedish Mauser and what improvements they made. With some changes they used the receiver which, incidentally, is the small ring

type. The tang was made a bit wider, the bridge was made without the clip slot and the raised portion, and the thumb groove was omitted from the left receiver wall. The same barrel threads are used, the breeching system is the same, with the barrel having a flat face. Except that the left locking lug is not slotted, the locking lugs are the same. The bolt face recess, bolt rib guide and extractor are also the same. The firing mechanism is essentially the same, but the HVA cocking piece is made lighter and the firing pin fall reduced by half, two improvements over the M96 design. Other HVA improvements are the auxiliary safety lug, the flanged bolt sleeve with its M98 bolt sleeve lock and the low-profile bolt handle. The trigger, essentially the same as that on the M98 Mauser, is no improvement.

HVA features which were not copied directly from any other action are the sliding tang safety and the bolt-stop/ejector. For sporting use the safety is an improvement, but the bolt-stop/ejector is a doubtful one. It is, however, an improvement in that the left locking lug need not be slotted for the ejector, and the bolt-stop need not project beyond the edge of the stock line. The bolt-stop would be better if it were built heavier.

HVA regressed in designing the gas-escape system. They would have been better off duplicating the venting system used on the M96 action. In addition, I feel there should be a gas-vent hole through the left side of the receiver ring, in line with the vent hole in the HVA bolt, or even two holes, with the second one just to the rear of the barrel face. I also see nothing wrong with a hole through the right side of the receiver ring and a small hole through the end of the extractor. These two or three vent holes would make this action much safer in the event of a serious cartridge head or primer failure. True, such failures are so rare

with modern commercial ammunition that one hardly needs to worry about it, but the handloader might want and need more protection.

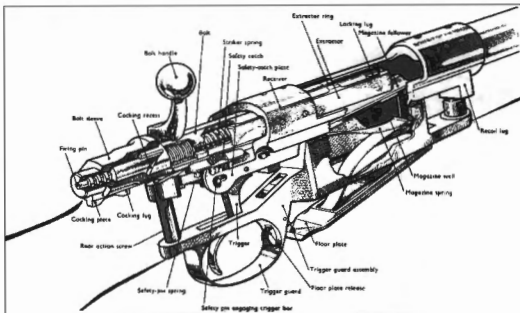
I also feel that the HVA breeching system would have been stronger and safer had an inside receiver collar been used, as in the M98 action. Still, the HVA breeching is not so much different from that used in the pre-1964 M70 Winchester, and I don't find much fault with it.

As for the HVA standard trigger, I would much rather have the regular two-stage military let-off, for with it the trigger can be a safe one and still have a final release that is short, free of creep, and light in weight. It would be just about impossible to obtain a short and moderately light trigger pull with the HVA trigger and still have a safe rifle. Few shooters and hunters today are satisfied with either a heavy, five pounds or more, trigger pull or with a double-stage pull, so the only solution to getting a good trigger let-off with the HVA action is to install a commercial adjustable trigger.

The statement in the S&W literature that the HVA action is made to cope with maximum pressures of 50,000 psi seems odd to me because the factory 270 load develops more than 50,000 psi yet it is one of the cartridges for which their rifles were chambered. Husqvarna also uses this action for the 7mm Magnum, which also develops higher pressure. I believe the HVA action with its solid locking lugs, safety lug and modern steels is suitable for cartridges developing up to some 55,000 psi breech pressure. There is little question that the HVA Improved Mauser is a strong action.

Smith and Wesson Rifles

Smith and Wesson, long known for their quality handguns, entered the rifle field in 1968. Their rifles are based on the exact



Husqvarna and Smith & Wesson Rifles

Operational Action Specifications

Weight	40 oz.
Receiver length	8.750"
Receiver ring dia.	1.290"
Bolt dia.	.700"
Striker travel	.500"
Bolt travel	4.550"
Bolt face recess:	
Diameter	.480"
Depth	.050"
Magazine well	
Length	3.385"
Width, rear	.595"
Width, front	.550"
Guard-screw spacing	7.187"

HVA Improved Mauser action I have described here, the only difference being that the S&W trademark emblem has replaced the HVA seal on the receiver ring. Except for some slight differences in stock design the S&W HVA rifles are almost the same as the HVA rifles listed by Tradewinds. The higher priced ones have the HVA adjustable trigger.

Takedown and Assembly

Make sure magazine and chamber are empty. To remove the bolt, raise the bolt handle and, with the tip of the thumb, hold the bolt-stop down and out; now pull the

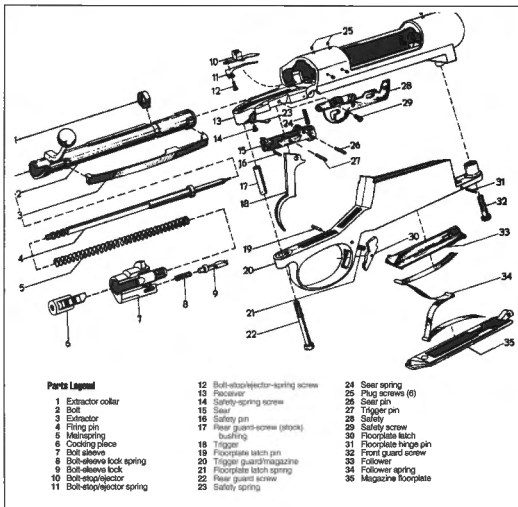
General Specifications

Type	Turn-bolt repeater.
Receiver	One-piece machined steel. (Early ones were probably machined from a forging, while the late ones are probably made from an investment casting.) Non-slotted bridge. Tapped for scope mounts and receiver sight.
Bolt	One-piece machined steel with dual-opposed forward locking lugs. Safety lug on one end. Integral low-profile bolt handle.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column five-shot box type. Hinged floor-plate. Trigger guard/magazine made of alloy, anodized black.
Trigger	Non-adjustable, single-stage pull. Fully adjustable trigger available at extra cost.
Safety	Sliding tang type, locks sear and bolt.
Extractor	Non-rotating Mauser type attached to bolt with a collar.
Magazine cutoff	None provided.
Bolt-stop	Positioned in the rear left of the receiver; stops bolt by contacting the gas-vent hole.
Ejector	Part of the bolt-stop.

bolt back and out of the receiver. The bolt-stop need not be depressed to re-insert the bolt.

To disassemble the bolt, grasp the bolt body with one hand and, while depressing the bolt sleeve lock plunger with the thumb of that hand, turn the bolt sleeve counterclockwise so the cocking piece falls into the cocking cam. Then, using a small screwdriver or the like in the other hand, pull the cocking piece back so the bolt sleeve can be turned

counterclockwise another turn. Continue turning until the bolt sleeve is unscrewed from the bolt. To disassemble the firing pin assembly grasp the bolt sleeve in one hand and, while resting the firing pin tip on a hard surface, depress the bolt sleeve until the cocking piece can be turned one-quarter turn in either direction. The cocking piece can now be lifted off and the firing pin and mainspring separated from the bolt sleeve. Depress the bolt sleeve lock plunger and turn it so its retainer stud is



released from its groove, after which the bolt sleeve plunger and spring can be removed. Reassemble in reverse order. Remove the extractor by turning it under the bolt and then pushing it forward. Do not remove the extractor collar unless absolutely necessary, as it may be sprung out of shape.

Turn out the front and rear guard screws from the bottom of the rifle and lift the barrel and action from the stock, and the trigger guard/magazine from the bottom of the stock. Drive out the pins from the trigger guard/magazine to remove the floorplate and floorplate latch. Turn out the safety spring screw and remove the safety spring. Drive the sear pin to

the left with a drift punch, turn out the safety screw and the safety can be removed. Remove the trigger and sear by driving out the sear pin. Turn out the bolt-stop spring screw and lift the spring and the bolt-stop from the receiver. Reassemble in reverse order.

The barrel is threaded tightly into the receiver (right-hand threads) and no attempt should be made to remove it unless you have the proper tools.

Markings

Late model HVA actions have the following stamped on the left receiver wall: HVA ACTION—MADE IN SWEDEN. The serial

number, proofmark(s) and the word **NITRO** are stamped on the flat under the receiver ring.

According to information I received from Tradewinds, Inc., who imported Husqvarna rifles, the Husqvarna firm in Sweden ceased the manufacture of all firearms in 1972. This means that the Husqvarna rifle, as well as the Smith & Wesson rifle, which are described in this chapter and the chapter on the Husqvarna Model 8000, were discontinued at about that time and have not been reintroduced. Smith & Wesson has introduced another high-power bolt-action rifle to replace their Husqvarna-made rifle and this new model is described in the chapter on the Savage Model 110 family.



Husqvarna Model 8000

NO SOONER HAD I written the original chapter on Husqvarna actions when an entirely new one was introduced, early in 1969. The Model 8000 HVA rifle action is quite a departure from one described in the preceding chapter.

Before describing the new action, I'll cover the Husqvarna rifles built on it. The best one, the M8000 Imperial, is quite an impressive rifle in every detail. Offered in 270, 30-06, 7mm Magnum and 300 Magnum calibers, this well-made Mauser type turnbolt rifle weighs about 7.5 pounds. The four-groove lightweight 23.62" barrel has no open sights on it, nor is it tapped for any. The rifle is intended to be used with a scope, and the receiver is suitably tapped, as it is also for mounting a receiver sight.

The well-proportioned stock, of select European walnut, is shaped to satisfy the average American shooter, being quite full in the forend, grip and comb areas. The fine-grained, well-colored stock is sanded level and smooth, then given a high-gloss plastic or varnish type finish. Two panels each of skip-line checkering decorate the sides of the forend and pistol grip. The stock has non-detachable sling swivels and a rosewood forend tip. The pistol grip cap and buttplate are plastic, with white-line spacers, as has the forend tip. Metal parts are beautifully polished and blued, except for the highly polished and jeweled bolt. The anodized alloy floorplate is lightly engraved. The M9000 Crown grade Husqvarna rifle is in every way similar to the Imperial grade, but the stock is a plainer piece of walnut with a semi-gloss finish, and it has open sights.

The HVA M8000 Action

To make it easier for me to describe and easier for you to follow, and to avoid some repetition, I will compare this new Husqvarna

action with the older HVA action described elsewhere.

To begin with, the trigger guard/magazine assembly on both actions is nearly identical, with both of lightweight alloy one-piece, construction. The follower spring, follower, and floorplate latch are also the same.

Outwardly, the M8000 receiver is quite similar to that of the early HVA, but it is slightly longer and has a wide and well-rounded tang surface like that on the new M70 Winchester. Underneath, however, there is quite a difference. Except for the recoil lug, the bottom of the M8000 receiver is round. It may be that this receiver is machined from bar stock or from a die forging, or it may be an investment casting. In any case, this would not reflect on the quality or strength of the receiver. It only indicates the Husqvarna has adopted a better method to make a better receiver. The several people I've shown this receiver to all agree that the recoil lug is made integral with the rest of the receiver and, if this is the case, the receiver probably is a modern investment casting.

The barrel, of course, is threaded into the receiver and it has a flat breech face.

The magazine well opening is 3.525" long, though the magazine box has an opening only 3.390" in length. In making the magazine well, cartridge guide lips are left on each side. There are no machine marks on the sides of the well and guide ribs, and the surfaces are unusually smooth and burr free. This is one reason why cartridge feeding is so easy and reliable.

Everything else is a radical departure from the earlier HVA action. The M8000 action has a number of new design features which rifle shooters seem to demand. These include a set of non-slotted forward locking lugs, a safety lug, recessed bolt face, cock-on-opening, enclosed bolt sleeve, side safety, cocking indicator, adjustable trigger, anti-bind bolt,

and a low bolt-handle profile for low scope mounting.

The fully recessed bolt head is cut away at the rim only for the extractor, the latter held in place and tensioned by a small spring and plunger set into a hole behind it. It is a close copy of the extractor in the Sako L-61 action. The ejector is a spring-loaded plunger fitted into a hole on the edge of the bolt-face recess.

The dual-opposed locking lugs are on the extreme front of the bolt and both are solid. As can be seen in the accompanying photo, the lugs are fluted in shape or, if you prefer, male dovetail shape. To complement this shape the locking lug guideways in the receiver are milled to a female dovetail form. Thus, as the bolt is opened and closed, with the left locking lug sliding snugly in its guideway, the front of the bolt is guided without binding. There is, in addition, a slight ridge on the lower corner of the right locking lug which slides in a groove cut along the right receiver wall, above the cartridge-guide lip, thus further guiding the front of the bolt.

The result is that the bolt cannot bind no matter how it is operated or by whom—it has to go in a straight line. Finally, the Husqvarna gunmakers finished the contacting surfaces of the bolt and the receiver so well that it is one of the easiest and smoothest actions to operate made. Since the dovetail shape of the locking lugs provides more contact area with the receiver locking shoulders than usual, this may be of some additional benefit in preventing set-back of the bolt in the receiver due to heavy loads.

There is a single gas-vent hole just behind and between the locking lugs which, when the

(Above) Model 8000 Imperial Grade Husqvarna sporting rifle, once imported by Tradewinds, Inc. It was made in 270, 30-06, 7mm Magnum and 300 Magnum.



Model 8000 Husqvarna action.



bolt is locked, would direct any escaping powder gases into the locking lug recess in the receiver and into the left locking lug raceway. There is no vent hole in the left side of the receiver, but none is needed because the bolt sleeve effectively seals off the rear end of the locking lug raceway so that gases cannot reach the shooter's face.

The M8000 lacks the separate safety locking lug found on the previous HVA and M98 Mauser bolts. Instead on the M8000 the bolt handle is the safety lug, and the tang of the receiver is notched for it. The bolt handle, made as a separate part, is expertly welded into a slot in the bolt. This, and other short-cuts taken in making this action, in no way affect the strength, performance, appearance or reliability of this action—nothing is sacrificed.

The bolt is drilled from the rear to accept the firing pin and coil mainspring. The one-piece firing pin, threaded into the cocking piece, is prevented from turning by a pin through the underside of the cocking piece. A cam on the top of the cocking piece rides a cam surface on the rear of the bolt and, on raising the bolt handle, the firing pin is drawn

back and cocked. On the full rise of the bolt handle the cam on the cocking piece rests in a shallow notch, which prevents the bolt sleeve and firing mechanism from being easily turned when the bolt is open.

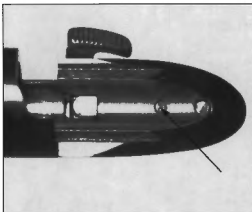
The bolt sleeve completely covers the cocking piece. Made with a long stem which fits inside the bolt body, it is held to the latter by an inside groove which engages over a lug on the end of the bolt body. This clever arrangement allows the firing mechanism to be easily removed and replaced. The front of the bolt sleeve is flared outward to seal off the locking lug raceways. Behind these flares it tapers back to a rounded end, making for clean simple lines. In the rounded end there is a small hole, and when the action is cocked, a bright spot on the end of the firing pin can be seen and felt, to serve as a cocking indicator.

The trigger, sear and safety mechanism are built into a steel sheet-metal housing attached to the underside of the receiver by a single pin. The sear, pivoting on a pin

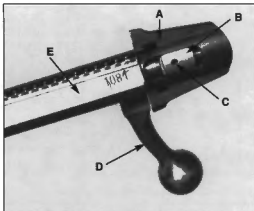
(Right) Floorplate engraving on a Model 8000 Husqvarna rifle.



Left side of the Model 8000 Husqvarna action, open.



Top view of the rear part of the Model 8000 receiver with bolt removed. Arrow points to the trigger weight-of-pull adjustment screw. Turning this screw counterclockwise reduces pull.



Underside view of the rear end of the Model 8000 bolt showing: (A) flared bolt sleeve, (B) cocking piece, (C) firing-pin retainer pin, (D) bolt handle, (E) groove for bolt-stop.

through the housing, is tensioned by a coil spring. When not cocked, the sear acts as the bolt-stop. A groove is cut into the bottom of the bolt in which the sear rides, and the bolt is stopped when the front of the sear contacts the end of the groove. Pulling the trigger back hard tips the sear down out of the path of the bolt so that the bolt can be removed. The sear must also be tipped down to replace the bolt. The sear is quite wide and rugged, and I believe it will stand up under the punishment of opening the action smartly, something which cannot be

said of all actions having a similar bolt-stop system.

The trigger is pivoted on a pin in the bottom of the housing. An arm extends straight up from the trigger, just forward of the front of the sear, where a shallow sear notch engages the trigger when the action is closed. Another arm on the trigger extends backward; between the end of this arm and the housing there is a coil spring backed by a screw. This is the trigger adjustment screw, and its head is exposed through a hole in the receiver tang. With the bolt removed this screw can be turned clockwise with a small screwdriver to increase the weight of the trigger pull, and vice versa. The total range of adjustment is from about 3 to 6 pounds. The trigger itself, well curved and grooved, is properly positioned in the guard for good control. Trigger travel is a longer than necessary, and it over-travels a bit when the sear is released, but neither is objectionable on a hunting rifle.

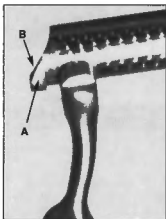
The safety pivots on the same pin as the trigger. The deeply serrated thumb-piece, extending just over the stock line on the right side of the rounded tang, is easy and convenient to operate. It is virtually noiseless. Pulling the safety back locks the sear and bolt. Pushed forward, a yellow dot in the stock is exposed, indicating the rifle is ready to be fired.

All M8000 action parts are made of steel except the trigger guard/magazine and floor-plate. All exposed steel parts of the receiver and bolt are expertly finished and polished. The surfaces are true, level and very smooth. There are no waves, dished-out holes or rounded edges. Few tool marks can be found

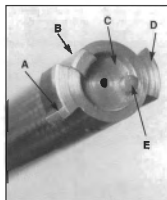
anywhere. Bolt operation is very smooth and easy. The bolt handle is well positioned for fast operation of the bolt from any position. The action is clean and smooth in outline. The same scope mounts which fit the earlier HVA action also fit this one.

Takedown and Assembly

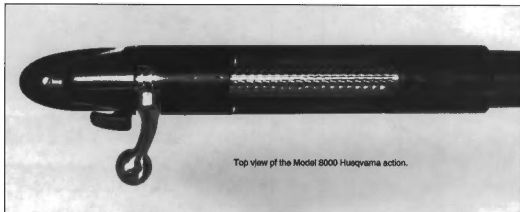
To remove the bolt, raise the bolt handle and pull back hard on the trigger; now pull the bolt out. To replace the bolt, the bolt head and locking lugs must be carefully aligned with the bolt and locking lug guideways in the



Rear end of the Model 8000 Husqvarna bolt showing: (A) bolt-sleeve retainer lug and (B) cocking-cam surface.



Model 8000 bolt head showing: (A) guide rib on the bottom corner of the right hand locking lug, (B) extractor, (C) bolt-face recess, (D) left locking lug, (E) ejector. Note fantail shape of both locking lugs.



Top view of the Model 8000 Husqvarna action.

receiver; again pull the trigger to lower the sear, and push the bolt home.

To disassemble the bolt, grasp the bolt body in one hand and turn the bolt sleeve clockwise one-half turn; the bolt sleeve and firing pin can now be removed from the bolt. To replace the firing mechanism in the bolt, align the open bottom of the bolt sleeve with the lug on the rear of the bolt, then push the bolt forward until it can be turned one-half turn clockwise. The firing pin, threaded into the cocking piece, is held from turning by a roll pin. Although there is no real need for ever removing the firing pin (except for replacement of parts or bluing the bolt sleeve), the firing pin can be turned out after driving the roll pin in and through the cocking piece, then unscrewing the firing pin.

The extractor can be removed by depressing the extractor plunger within the bolt with a jeweler's screwdriver and lifting it out. Replace the extractor by inserting the spring and plunger in place, then insert the extractor and back it into place. The ejector, held in place by a hollow pin, can be driven out after the extractor has been removed.

To remove the barreled action from the stock, turn out the front and rear guard screws,

then lift out the barrel and action. Then pull the trigger guard/magazine from the bottom of the stock.

Remove the trigger mechanism by driving out the pin in the very top of the housing which holds the housing to the receiver, and pull the mechanism free. Do not disassemble this mechanism unless absolutely necessary, and then do it with utmost care.

Markings

The Husqvarna rifle is marked through a roll stamping on the top middle of the barrel:

HUSQVARNA
VAPENFABRIKS A.B.

This is followed by the caliber designation. The serial number is stamped rather carelessly on the left side of the barrel breech. The last four digits of the serial number are also etched on the bottom of the bolt. A proofmark and the word NITRO under it are stamped on the breech—the proofmark is stamped under the receiver also. The Husqvarna trademark and the word SWEDEN are stamped on the top of the receiver ring. The trademark is also

molded into the plastic buttplate. The model designation is not stamped on the rifle.

The 1870 Smith & Wesson Rifle

In the previous chapter describing the early Husqvarna action, I pointed out that the Smith & Wesson bolt action rifles introduced in 1968 were built on this action. After the introduction of the improved HVA action described in this chapter, the 1970 line of S&W rifles were based on this new action. Except for the change in the actions, the 1970 S&W rifles remained about the same. Adopting the new HVA action improved the S&W rifles. As mentioned earlier in this chapter, the HVA M8000 and M9000 rifles were introduced in about 1969, and as mentioned in the previous chapter, Husqvarna ceased manufacture of firearms in 1972, making these two models short-lived ones. I have no knowledge that Smith & Wesson ever imported this model. I also have no information as to how many of these HVA rifles were made, but surely the number must be quite small.

Dimensional Action Specifications

Weight	40 ozs.
Length	9.00"
Receiver ring dia.	1.293"
Bolt dia.	.700"
Bolt travel	4.375"
Striker travel	.300"
Bolt face recess:	
Depth	.115"
Dia. (Standard calibers)	.485"
Magazine length	3.390"
Guard-screw spacing	7.75"

General Specifications

Type	Tumbolt repeater.
Receiver	One-piece machined steel with unslotted bridge and integral recoil lug. Tapped for top scope mounts and receiver sight.
Bolt	Machined steel with dual-opposed forward locking lugs. Low profile handle, welded on, serves as safety locking lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening. Bolt has 80° swing.
Magazine	Non-detachable five-shot box-type with hinged floorplate. Four-shot for magnum calibers.
Trigger	Single-stage, adjustable for weight of pull.
Safety	Pivoting side tang type looks rear and bolt when tipped back.
Extractor	Hook type in bolt head.
Ejector	Plunger type in bolt head.
Bolt-stop	Sear doubles as bolt-stop; stops bolt by contacting end of a groove cut into bolt body.



IN LATE 1969, Interarms, Ltd., announced a new commercial M98-type turnbolt action, which they designated the Mark X. I obtained one, and printed on the box is **MARK X CUSTOM MAUSER COMMERCIAL ACTION**. It is made in Yugoslavia by Zavodi Crvena Zastava.

The Mark X action, based on the original M98 design, has most of the features that made the M98 famous, plus some modern elements, which accounts for Interarms describing it as a "custom" action. The literature and advertisements describing the Mark X contain the following statements: "A custom, commercial Mauser action, forged and machined by true craftsmen from the finest high carbon steel." "The Mark X says 'honest craftsmanship'... that old-fashioned, almost forgotten concept of real value for money spent," etc.

Let's see what the Mark X action looks like. Based on the standard length (8.75") large-ring (approx. 1.40") M98 Mauser receiver, it is threaded to accept the standard M98-type barrels. The bridge is made without a clip-cartridge guide slot, the left receiver wall un-notched. Receiver ring and bridge are tapped for top scope mount bases, and the right side of the bridge is tapped for a standard receiver sight. Six holes in all, 6x48 size, all holes fitted with plug screws. The bolt is identical to the standard M98 bolt, except for a low bolt handle profile to clear the lowest-mounted scope. The round grasping ball is flat underneath and checkered. The streamlined bolt sleeve, firing pin, mainspring, cocking piece and bolt sleeve lock are like the modern FN M98 action design, including the safety lug feature on the firing pin shoulder. Striker travel is .500". Cocking occurs on the upthrust of the bolt handle. The bolt-stop and ejector are M98 copies.

The trigger guard/magazine is a one-piece steel unit, the steel floorplate is hinged and its latch positioned in the front of the guard bow. The follower is milled steel.

Two types of triggers were available in 1969; a standard single-stage, non-adjustable trigger not unlike the M98 military trigger, or a fully adjustable single-stage trigger mechanism at extra cost. A sliding side tang safety is standard with either trigger, a safety which locks the bolt and sear on the non-adjustable trigger and locks the bolt and trigger on the adjustable trigger. The complete action weighs about 46 oz. It is of all-steel construction—no alloy or plastic parts are used.

Mark X actions are made to handle three family lengths of cartridges; namely, for the long belted magnums the magazine box is slightly over 3.600" long; for the 30-06 class the box is about 3.385" long, and, for such cartridges as the 22-250, 243, et al, the 3.385" magazine is made shorter through the use of a sheet-metal spacer.

Like the FN receiver, the Mark X action has the collar or shoulder inside the ring slotted on the left side as well as on the right side for the extractor. I believe these actions would be stronger and safer if this collar were unslopped on the left side.

My first Mark X action was poorly polished. The floorplate is not level and smooth—it has several flat spots which can be felt and seen, as if extra polishing was done to remove deep tool marks from these places. The floorplate and the guard were polished separately instead of together, leaving the edges of the hinge joint rounded. The bolt-stop and the bolt-stop spring were also polished separately on a soft polishing wheel, and their rounded edges certainly look out of place on a "custom" action. A soft wheel must also have been used on the receiver, for the sight-mounting screw holes are dished and edges of the left receiver wall are rounded. It is not that the tool marks have not all been removed from the metal surfaces which show when the action is stocked, or that these surfaces do not have a high polish, but that the

polishing was inexpertly done. All major parts except the follower, extractor and the front part of the bolt are blued.

Aside from that, the Mark X action which I received in 1969 on the whole appears to be well made. The main functional and working parts are mechanically interchangeable with parts from other M98 actions. Even with these minor faults I considered it a good value for the money.

The Mark X action is serial-numbered, and the stamp is on the right side of the receiver ring. The **Mark X** designation is stamped on the left side of the ring. There are also numbers stamped on the bottom of the bolt handle stem and on an inside surface of the trigger guard, but on my 1969 Mark X Mauser action these numbers do not match the serial number on the receiver.

Stamped on the left receiver wall in two lines is the following:

ALEXANDRIA INTERARMS
VIRGINIA/ZASTAVA -
YUGOSLAVIA

The ZCZ trademark (the letters within a circle) is also stamped on the left receiver wall.

Soon after the Mark X actions were introduced, barreled actions also became available. The actions were suitable to be barreled to many modern calibers; one action for cartridges of 30-06 head size and the other for belted magnum cartridges. Barreled actions also came in many calibers, and at this writing, 1993, they are still available. Also not

(Above) The Mark X Mauser Whitworth Rifle. This model comes in a variety of popular calibers from the 22-250 to the 30-06 and 7mm Rem. Mag., 300 Winchester Mag., 338 Mag. and 458 Magnum. This model, as well as the other Mark X Mauser models, is built on the Mauser Model 98 commercial action, one of the best turnbolt actions ever designed for military and sporting rifles.



Right side of the Interarms Mark X (Mauser) action.

long after the Mark X was introduced, complete rifles became available.

In 1983 Interarms cataloged the following styles and types of Mark X rifles: **Mark X Standard Rifle**—Checked walnut stock with Monte Carlo cheekpiece, forend tip and grip cap, white-line spacers and sling swivel studs. Features hinged floor plate, 24" barrel with adjustable rear and ramp front sight, in calibers 22-250, 243, 25-06, 7 x 57, 270, 7mm Magnum, 308, 30-06 and 300 Magnum. Weight is 7.5 pounds. **Mark X Alaskan Magnum**—About the same as Standard Rifle except in 375 H&H Magnum and 458 Magnum calibers only and weighing 8.25 pounds. **Mark X Continental Mannlicher**—European walnut stock with full-length forend, straight comb with cheekpiece, and checkering. Features 20" barrel with adjustable rear and ramp front sights in calibers 243, 270, 7 x 57mm, 308 and 30-06, button-release hinged

floorplate, adjustable single-stage or double-set triggers and butterknife bolt handle. **Mark X Cavalier**—About the same as the Standard Rifle above except has stock with recoil pad, roll-over cheekpiece comb, rosewood forend tip and grip, cap and flat-bottomed forend. **Mark X Marquis Mannlicher**—About the same as the Continental Mannlicher except somewhat different stock and in calibers 243, 270, 308 and 30-06. Weight 7.5 pounds. **Mark X Viscount**—Classic-style checkered walnut stock with cheekpiece, sling swivels, 24" barrel with adjustable rear and ramp front sights in calibers 22-250, 243, 25-06, 270, 7 x 57mm, 7mm Magnum, 308, 30-06 and 300 Magnum. Weight 7.5 pounds.

Interarms Mark X Whitworth Model Rifle

In 1994, twenty or so years after I purchased the Mark-X action described earlier in this chapter I purchased an Interarms Mark X rifle.

It is cataloged as the Whitworth model. I was quite surprised at what I got because it was more rifle than I expected to get. I checked it over carefully and here is what I found: The stock caught me off guard, not because of the quality of the walnut but its overall shape and appointments. It is a plain piece of European walnut in a plain oil-type of finish. Nothing fancy about it, although it could have been trimmed better around the trigger guard and floorplate. It is otherwise perfectly shaped and finished with all the unchecked surfaces level and smooth. A black tip properly fitted and shaped dressed off the forend, and a thick smooth-sided rubber pad finished off the butt. A black well-shaped oval cap finished off the pistol grip. No white-line spacers spoil the looks. A trend which I noticed, that is to my liking beginning in the '80s, was that many arms manufacturers had discontinued the use of white-line spacers on many of the stocks



Left side of Interarms Mark X action with bolt open.

Top view of the Interarms Mark X (Mauser) action.



they made, and more and more of them used rubber pads instead of steel or plastic buttplates.

The next feature I noted was the large amount of cut checkering on my Mark X stock. The forearm had wrap-around checkering, sides and bottom, and larger than average panels on the pistol grip. To have this amount of checkering done on several of the rifles I had made cost me \$50 or more, and the checkering on the Mark X stock was not at all carelessly done.

On removing the barrel and action from my Mark X stock, I found that the recoil shoulder was bedded in a bedding compound and that the forearm channel was routed out deep enough to float the barrel free of contact with the wood except for a couple of inches at the tip, which did contact the barrel with some

pressure. I have nothing to complain about concerning the inletting.

Now I come to a feature on the Mark X stock that really surprised and delighted me, and that was the cheekpiece. If my rifle had cost a thousand dollars or more, it could not have had a cheekpiece more pleasing to me. Even though the cheekpiece could have been made a bit smaller or placed a bit further forward, nevertheless it pleased me no end. What's more, it was dressed off with a shadow line so perfectly done that an amateur stockmaker could learn from it.

For a sporting rifle with 24" barrel the forearm could have been made a couple inches shorter. It came fitted not only with quick-detachable sling swivel studs but also with the swivels included. Next to be examined was the action and the barrel. The sporter-weight barrel is nicely contoured and finished, and attached to it with screws are an adjustable rear open sight in a ramp base and a gold bead front sight on a ramp. The barrel, receiver, trigger guard and floorplate are well polished and blued. In the polishing, the screw holes were not dished out as on the Mark X action I

Dimensional Action Specifications

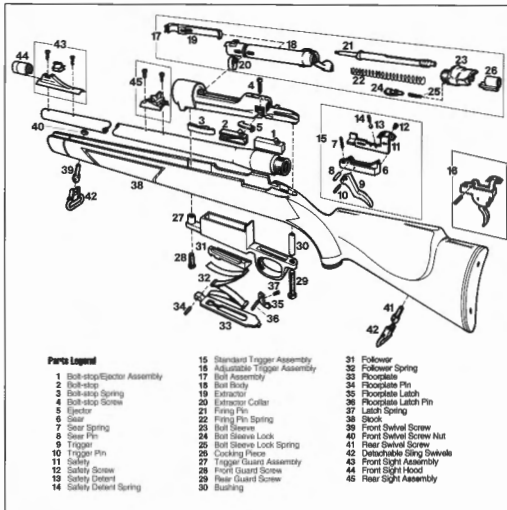
Weight	45 oz.
Length	8.750
Receiver ring diameter	1.410
Bolt diameter	.695
Bolt travel	4.500
Striker travel	.285
Guard screw spacing	7.813
Guard screw threads	¼ x 22

General Specifications

Type	.....	Turnbolt repeater operated by bolt handle.
Receiver	.....	One-piece all steel construction, integral recoil lug, drilled and tapped for scope mount bases.
Bolt	.....	One-piece construction, low profile bolt handle, dual-opposed front locking lugs, safety lug near the rear, guide rib, all close duplicates of Mauser M98 bolt.
Ignition	.....	One-piece firing pin, coil mainspring and cocking piece. Cocks mainly on opening of bolt.
Magazine	.....	Non-detachable, staggered-column box magazine, hinged floorplate.
Trigger	.....	Single-stage, adjustable for weight of pull, sear engagement and over-travel or optional non-adjustable single-stage trigger.
Safety	.....	Side tang sliding safety built into trigger mechanism, and the adjustable trigger locks trigger and bolt. On the early non-adjustable trigger the safety locks the bolt and the sear.
Extractor	.....	One-piece, Mauser type attached to bolt by a collar, non-rotating.
Bolt-stop	.....	Pivotal, mounted on left rear of receiver, stops bolt travel on contacting left locking lug.
Ejector	.....	Spring-tensioned lever mounted in bolt-stop box and slides through slot in left recoil lug.
Takedown	.....	None provided, barrel threaded tightly into receiver.



Left side of the Mark X Mauser Whitworth showing the classic English-style cheekpiece.



had purchased much earlier, nor were the edges of other parts rounded off. All these parts were blued. The only noticeable change in the actions of my rifle and that of the early Mark X was the floorplate latch. In my new rifle this latch is a cross-bolt affair, and a pretty good one at that.

All the rest of the action on my new rifle is a duplicate of the earlier one; the same bolt-stop, the same adjustable trigger and the same safety. For concise, complete and detailed information on this trigger and how to adjust it read the caption for the illustration of this trigger. This information is very important—one reason being that if any adjustments are

made to the trigger, an adjustment has to be made also on the safety.

It was the first new rifle I have gotten in a long time with the bore filled with grease. My Mark X Mini-Mauser also came that way.

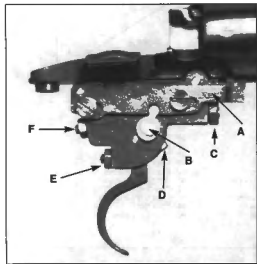
My Interarms Mark X in 22-250 caliber weighs 7.5 pounds. The 1994 *Gun Digest* lists only three models of the Mark X Mauser: the Whitworth model as shown here, the Viscount model and the Whitworth Express model. The Whitworth model came in 22-250, 243, 25-06, 270, 7x57, 308, 30-06, 7mm Rem. Mag., 300 Win. Mag., all with five-shot magazine; and Magnums with three-shot magazine. The Viscount came in 22-250, 243, 25-06, 270,

7x57, 308, 30-06, 7mm Rem. Mag. and 300 Win. Mag. This rifle differs from the Whitworth in that it has a Monte Carlo comb, a somewhat differently shaped pistol grip, no added forend tip, and but with white spacers at cap and butt. The Whitworth Express is made in calibers 375 H&H and 458 Win. Mag., but otherwise like the regular Whitworth.

The Whitworth stock is about as "Classic" as any made and if it were minus the black forend tip, and if the shadow line on the cheekpiece had been omitted, it would rival the stock on the post-1994 Model 70 Winchester. Other than these two features both stocks are almost twins. My Mark X has not



Left side of the Mark X action fitted with the fully adjustable single-stage trigger mechanism.



The Mark X adjustable trigger and safety mechanism, showing: (A) sliding thumb safety; (B) rotary safety lock which blocks trigger when the safety is pulled back; (C) weight of pull adjustment screw; (D) safety adjustment screw; (E) trigger stop or over-travel adjustment screw; (F) sear engagement adjustment screw. The bolt lock is an integral part of the heavy sheet-steel safety. Note that all three trigger adjustment screws have lock nuts to prevent their accidental turning. To make adjustments the lock nuts must first be loosened, then tightened again afterward. The stock must be removed before any adjustments can be made. To decrease weight of trigger pull, turn out (counterclockwise) screw C. About two pounds is the lightest pull that can be obtained with safety. To adjust for minimum over-travel: with bolt closed and striker in fired position, turn in (clockwise) screw E all the way, and then back it out $1/8$ -turn. To obtain minimum safe trigger take-up or sear engagement: with bolt closed and action cocked, turn in (clockwise) screw F until the sear is released, then turn it back one-quarter turn. After any adjustments are made test the action by slamming the bolt closed several times; if the striker does not stay cocked while this is done then the sear engagement is too shallow, the weight of pull is too light, or both. This trigger is unusual in that it has an adjustment screw to take up wear in the safety bolt. This screw (D) is threaded into the rotary safety bolt (B) and prevented from easily turning by a small coil spring under its head. As wear develops (this would be indicated if there is trigger movement when the safety is engaged) this screw can be turned in (clockwise) until trigger movement is gone.

been tested for accuracy, but I feel confident that it most likely will be as accurate as any 22-250 sporter made.

There are two things on my action which should not have been there, both are minor but irritating. One is that the front edge of the floorplate is sharp, and a shooter could easily skin a finger on it. It should have been rounded off a bit before leaving the factory. The other is the head of the rear guard screw. It was so battered that only the thinnest bladed screwdriver would fit. After filing the battered portion down, polishing and bluing it, it was

then a normal screw. Whoever assembled this rifle at the factory surely should have noticed this, discarded the screw and replaced it with a good one. Little things, to be sure, and correcting them would not have cost the manufacturer one cent more.

The complete disassembly and reassembly instructions given in the chapter on the Model 98 Mauser also apply to the Mark X Mauser.

My Interarms Mark X Whitworth Mauser rifle is marked as follows:

Left side of receiver:

ALEXANDRIA VIRGINIA
INTERARMS
MANCHESTER ENGLAND
Left side of the tang:

MADE IN YUGOSLAVIA

Left side of receiver ring:

MARK X

The serial number is stamped on right side of the receiver ring. There is also a number stamped on the right side of the receiver bridge. There are proofmarks stamped on the barrel and on the receiver. The caliber is stamped on the left side of the breech.



INTRODUCED IN 1987, the Interarms Mini-Mark X is a sound and economically priced rifle which the owner can be proud of, and which has accuracy equal to rifles of higher price. Made in Belgrade, Yugoslavia, by Zavodi Crvena Zastava, and imported and distributed in the U.S. by Interarms, the Mini-Mark X has captured its full share of sales of rifles of its class and caliber. Originally chambered only for the very popular 223 Rem., it was later also chambered for the 7.62x39mm cartridge. In 22-caliber, it's an outstanding varmint rifle, and in the 30-caliber, very suitable for taking deer-size game.

Although the "Mini Mauser" was made in Europe it is nevertheless all American, especially the stock. The rifle in 223-caliber weighs 6.35 pounds. Made of walnut-stained hardwood, the stock has a full pistol grip, Monte Carlo comb, cheekpiece, and a black plastic buttplate and pistol grip cap that are both checkered. The forend is well shaped, rounded at the bottom and with sides slightly flattened. The pistol grip and the sides of the forend sport a very generous amount of cut checkering. Unlike a lot of American bolt-action rifles in the lower price range, the Mini-Mark X stock is expertly sanded. It has no waves, bumps or hollow spots, and no sanding marks. On this almost perfect level surface, a glossy finish has been applied smoothly and evenly. I would prefer to see a somewhat smaller but thicker cheekpiece, and a bit more wood removed from the bottom of the stock over the length of the action. Lastly, American-style sling swivel studs have been installed. With the blued barrel and action in place, and with a polished bolt in the action, the Mini-Mark X is one good-looking rifle.

Separating the metal parts from the stock on my rifle revealed rather rough machine inletting in the stock. There were wood splinters and splinters all over, and especially so in the

action inletting. A five-minute job of sanding easily removed them. Little care was used in the inletting, but this was not the case with the final fitting and bedding of the barrel and action into the stock. A bedding compound of some kind was used in the recoil lug area. A 1½-inch-long pressure point in the end of the barrel channel gives some upward pressure against the barrel. Between this pressure point and the recoil lug area, wood was routed out so that the barrel was not touching wood in this area. I have received several reports from owners of this rifle that accuracy is quite acceptable—near minute of angle or better. The Mini-Mark X is a very good value for the money.

The Action

The Mini-Mark X action has a number of Mauser M98 features and it's stretching the point, I suppose, but it can be called a Mini Mauser. But if a M98 Mauser action is placed beside the Mini, it shows there is certainly a lot of difference between the two. The visible M98 features on the Mini Mauser are: bolt-stop, bolt sleeve, cocking piece and the general shape of the top of the receiver bridge with its extraction cam. With the bolt removed, the dual opposed locking lugs can be seen. All of these parts are smaller than M98 Mauser parts.

The receiver most likely started as an investment casting of a suitable steel. It is threaded up front to receive the barrel, but there is no inside collar in the receiver ring as there is in the M98. The 20" round tapered barrel is well polished and is shaped and contoured similar to the No. 1 Shilen barrel. Its muzzle diameter is .545". It is neither slotted nor drilled and tapped for iron sight mounting. The receiver is flat on the bottom like that on the M98, and the integral recoil lug is adequate in size for the calibers the rifle is made in. The front guard screw threads into this lug.

Four threaded holes, two in the receiver ring and two in the bridge, are there for scope mount bases.

The bolt-stop and ejector are miniatures of the M98 Mauser unit. They are mounted on a stud on the left rear side of the receiver and pivoted there on a screw. The Mini-Mark X parts list calls this the ejector housing. The bolt-stop is provided with a heavy spring so that it can be pivoted to remove the bolt. The ejector is also pivoted on this screw.

The two opposed locking lugs on the front of the bolt engage in matching recesses in the receiver ring. The left lug, like that of the M98, is slotted for passage of the ejector. The extractor is in no way similar to the M98 extractor. Instead it is a small and simple claw held in place in a slot in the bolt head, and pivots on a pin. It rotates with the bolt. Unlike that in the M98, the bolt face on the Mini-Mark X recess is not undercut, thus leaving a rim of steel completely surrounding the cartridge head, with the exception of a narrow cut for the extractor. A bar on the right side of the bolt serves as a bolt guide. It fits between the bolt handle and the right locking lug and is held in place by a ring and pin much like the bolt guide that Sako uses. This bar has a lengthwise groove along its lower outside edge which engages over a ridge on the inside edge of the right receiver wall. At first glance this bar or guide may appear to some as the extractor, and I have noticed that some persons have confused it as such. A gas escape vent in the bolt provides some safety to the shooter in event of a primer rupture which might allow powder gases to enter the bolt. This is done by having a small hole near the front of the bolt and a matching hole in the bolt guide.

(Above) The Interarms Mini-Mark X rifle, available in 223 or 7.62x39.



Right side of the Mini-Mark X action.

As with the Mauser M98 bolt, the rear end is enlarged to give added bearing surface for the cocking piece. Also the low-profile bolt handle is attached to, or made as an integral part of this large portion. The bolt handle knob is round but flattened underneath and checkered, as was the commercial FN Mauser action.

At the rear of the bolt and inside it, there are several M98 influences. The bolt sleeve threads into the bolt and is fitted with a spring and plunger to serve to keep the sleeve from turning when the bolt is open, just as with the M98. The cocking piece and the firing pin are attached together as in the M98, and the cocking piece is plainly visible. It can serve as the cocking indicator. The travel of the firing pin is less than half that of the military M98 Mauser with the result that lock time of the Mini-Mark X is much faster.

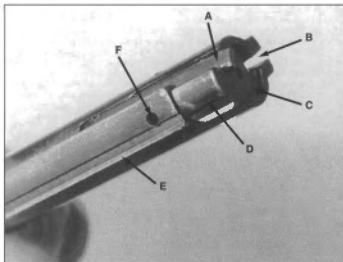
The trigger guard, magazine box and floorplate are all made of steel. Of double column width, the magazine box is merely a steel shell fitted to the trigger guard and held in place by a screw at the rear of the box. The screw is threaded at an angle into the trigger guard. The floor plate is hinged to the front of the trigger guard by a pin. The floorplate is held closed by a rather thick spring-tensioned crossbolt. Pushing the crossbolt to the left releases the floorplate to allow it to swing open. The usual W-shaped magazine spring is used with its lower end slip-fitted into the floorplate and its upper end into the polished steel follower. Cartridge guide lips are machined into the receiver magazine well. Screws through the front and rear ends of the trigger guard are threaded into the receiver and hold the trigger guard/magazine assembly in place below the receiver. They also serve to

hold the barrel and action securely in the stock. Guard screw spacers of proper length limit how far the magazine can be drawn to the action. The overall quality of the trigger guard/magazine is good, especially considering the price of the rifle.

The Trigger

Built within a steel housing the trigger mechanism is comprised of the sear, trigger, safety and safety cam, along with the neces-

sary screws, pins and springs. The assembly is fastened to the bottom of the receiver by a cross pin and held tight by a screw. The whole is not unlike many other triggers having a side-mounted sliding safety. The trigger has a full range of adjustments including weight of pull, over-travel and take-up. The safety cam is also fitted with a screw so that it can be adjusted. This adjustment is vital, and if any adjustments are made to the trigger the safety *must* also be adjusted. To make any



The bolt head of the Mini-Mark X showing: (A) extractor; (B) ejector slot in the left locking lug; (C) cartridge head recess; (D) anti-bind groove in the right locking lug; (E) anti-bind bolt guide rib; and (F) gas vent holes in bolt and guide rib.



Left side of the open Mini-Mark X action.

adjustments, it is first necessary to remove the stock. According to one gunsmith-dealer who has sold a number of Mini-Mark Xs, trigger and safety adjustments have to be made on new rifles if the shooter finds the factory adjustments not to his or her liking. I found this to be true with the rifle I purchased, which had a trigger with far too much slack, or take-up, and a weight of pull over five pounds. Rather than describe this trigger further, I will include here, word for word, the factory directions:

**WARNING:
INCORRECT TRIGGER ADJUSTMENT
CAN BE DANGEROUS!**

The adjustable trigger is pre-set at the factory for optimum performance. No attempt should be made by the user to re-adjust the trigger for personal preferences unless the user fully understands the pur-

pose and function of all adjustment screws, follows the instructions exactly and confirms his work by thoroughly testing the trigger and safety with the rifle unloaded before further use.

Failure to heed this warning can result in faulty adjustment which might permit the rifle to fire without the trigger being pulled, or to fire with the safety "On".

No attempt should be made to reduce the weight of pull below $3\frac{1}{2}$ pounds. This should be checked with a trigger gauge. Maintain sufficient trigger/sear engagement to prevent "jarring off" if the rifle is dropped or the bolt closed forcefully. The engagement is visible through the "window" on the left side of the trigger housing.

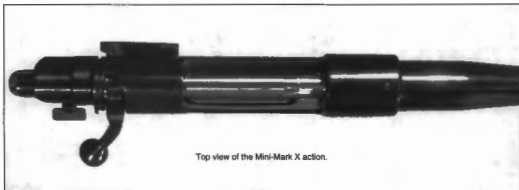
Screw (I) should not be loosened and must always be kept tight. Screw (I) is not an adjustment screw; its purpose is to prevent any looseness between the trig-

ger housing and the rifle receiver.

Whenever any adjustment is made to the trigger, it is absolutely essential to also re-adjust screw (E). This must be done last. With the safety in the "On" position, screw (E) must be turned in until its point bears against the trigger. If then the safety is difficult to manipulate, screw (E) may be backed off very slightly until the safety moves easily. Check this adjustment by applying firm finger pressure to the trigger with the safety "On". There should be practically no movement of the trigger.

All lock nuts should be securely tightened while holding the adjustment screws to prevent inadvertent turning. Adjustments should be secured with a thread adhesive such as Loctite.

To ensure safe operation, it is strongly recommended that any re-adjustment be entrusted to a qualified gunsmith.



Top view of the Mini-Mark X action.



Left-side view of the Interarms Mini-Mark X.

General Specifications

Type	.....	Tumbolt action repeater, operated by bolt handle.
Receiver	.....	Steel, one-piece construction with integral recoil lug. Drilled and tapped for scope mounts.
Bolt	.....	Steel, one-piece construction, forward dual opposed locking lugs, left locking lug slotted for ejector, recessed bolt head, low profile bolt handle. Bolt is fitted with guide rib which engages the right receiver wall.
Ignition	.....	One-piece firing pin powered by coil spring, cocks on opening the bolt.
Magazine	.....	Staggered double-column, five-shot capacity for 223, four-shot for 7.62x39, hinged floorplate.
Trigger	.....	Semi-single-stage mounted in box, with limited adjustments for weight of pull, sear engagement and over-travel.
Safety	.....	Sliding tang-side safety mounted in trigger housing, locks trigger and bolt.
Extractor	.....	Spring-tensioned claw fitted in slot in the bolt head. Extractor rotates with bolt.
Bolt-stop	.....	Mausier M98 type hinged on screw and stud on left receiver wall, stops bolt travel when bolt-stop contacts left locking lug.
Ejector	.....	Spring-tensioned lever mounted in bolt-stop box on bolt-stop screw.

Dimensional Action Specifications

Weight of action	... 1.75 lbs. (est.)
Receiver length	..... 7 1/4"
Receiver ring diameter	..... 1.195"
Bolt body diameter	..... .546"
Bolt travel	..... 3.111"
Striker travel	..... .260"
Guard-screw spacing	..... 6.25"
Magazine-well opening:	
Length	..... 2 3/4"
Bolt face partial recess:	
Depth	..... .050"
Diameter	..... .387"
Guard screw threads	..... 229x25 (t.p.i.)

IMPORTANT:

ALL ADJUSTMENTS SHOULD BE MADE WITH THE FIRING PIN IN COCKED POSITION

Sear Engagement Adjustment

Engagement between sear (B) and trigger (A) is adjusted with screw (C). This may be observed through aperture (c). After adjustment, nut (b) should be tightened to set each screw. Prior to adjustment, safety lever (D) must be in rear position and nut (b) partially unscrewed.

Weight of Pull Adjustment

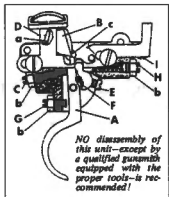
Screw (H) is turned counterclockwise to decrease weight—clockwise to increase weight of pull. After adjustment, nut (b) is tightened to set screw (H) in chosen position. The weight of pull may be adjusted from 3 1/2 to 5 pounds.

Back-Lash Adjustment

When the trigger is pulled it comes to rest against screw (G). Back-lash can be minimized by turning screw (G) clockwise. It must not be turned so far that sear (B) cannot slide freely. After adjustment, nut (b) must be tightened to set screw (G).

Safety Adjustment

The safety is adjusted by means of screw (E), which should be advanced until its point bears on the trigger surface. In this position, safety (F) moves easily in its notch in safety lever (D)—and in the safe position fully blocks the trigger. Finally, screw (I) should be tightened slightly to reduce vertical play.



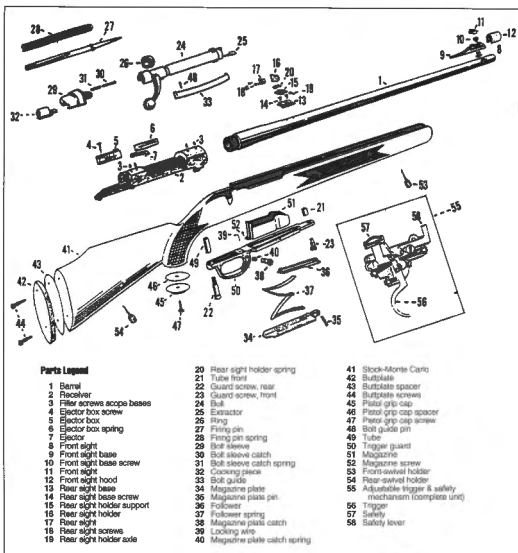
Drawing of the Mini-Mark X trigger.

WARNING:

FAILURE TO READ, UNDERSTAND AND FOLLOW THE ACCOMPANYING WARNINGS AND INSTRUCTIONS MAY DEFEAT THE DESIGN AND PURPOSE OF THE TRIGGER/SAFETY FUNCTION AND RENDER THE FIREARM UNSAFE! USE CAUTION AND COMMON SENSE!

In the above instructions you will note the number of repeated cautions. My gunsmith-dealer friend adjusted the trigger in his Mini-Mark X to a crisp three-pound pull, and I did the same with my rifle.

The factory instructions have much to say about the safety and its use. The very best safety is an unloaded gun with its action open. Factory instructions never tell you this, nor do magazines or books. In my humble opinion the next best safety on the Mini-Mark X, and with many other bolt actions having a cocking arrangement similar to this rifle, is the bolt handle. Yes, I said the bolt handle. On this rifle and many others, the rear end of the bolt has a deep cocking cam notch and just beyond it a shallow notch into which the cocking piece must pass, or slip into, every time the action is opened or closed. On raising the bolt handle in one rapid motion after the rifle has been fired, you hardly notice this notch. However, on lowering the bolt you certainly will, and you will notice it on opening the



action if the action is already cocked. For example, if you lower the bolt handle slowly you cannot help feel when the cocking head slips into this notch, and again when the action is opened with the action cocked. In this position it requires a noticeable effort to either fully raise or lower the bolt handle, and in this position the bolt cannot be pulled back nor can the rifle be fired.

No matter how cold or numb your trigger

hand becomes, or if it is gloved or mittened, the bolt handle can be felt and easily lowered when you want to fire the rifle. But more than that, and I feel this is as important, is that others can see at a glance that your rifle cannot be fired. Again, the factory instructions don't tell you this. They stress the safety button. As for me I would rather have no safety button at all on my rifle and use the bolt handle instead.

Disassembling & Reassembling

To disassemble, first open the bolt and make sure the chamber and magazine are empty. To remove the bolt, raise the bolt handle, and, while holding the bolt-stop outward, slide the bolt out of the receiver. To disassemble the bolt, insert a small Allen wrench through the hole at the bottom of the cocking

PART II: Commercial Rifles & Actions

piece and, grasping the bolt with the right hand and with the thumb depressing the sleeve lock plunger, turn the bolt sleeve counterclockwise until it and the firing pin can be withdrawn. Separating the firing pin, mainspring and cocking piece from the bolt sleeve is not easily done and unless absolutely necessary should not be attempted. However, to disassemble these parts the bolt sleeve must be moved forward enough so that the cocking piece can be rotated to unlock it from the firing pin. Reassemble in reverse order. Also, unless absolutely necessary, do not remove the extractor or bolt guide from the bolt. These bolt parts are held in place with small pins. To remove the bolt-stop and ejector merely remove the screw holding these parts in place. To remove barrel and action from the stock, first turn out the rear guard screw and then the front one, and lift this assembly out of the stock. Now the trigger guard/magazine assembly can be withdrawn from the stock.

Markings

On the left receiver wall:

ALEXANDRIA INTERARMS MANCHESTER
VIRGINIA ENGLAND

On the left receiver ring:

MARK X MZ

The serial number is on the right side of the receiver ring.

The same number is stamped underneath the bolt handle. On my rifle there is also the number 91 stamped on the right side of the receiver bridge, which may indicate the year of manufacture.

On the left side of the tang, hidden by the stock is:

MADE IN YUGOSLAVIA

The caliber is stamped on the left side of barrel breech.

The proofmarks are stamped on the right side of the barrel breech.

Comments

I have a high regard for the Mini-Mark X and the 223 Remington cartridge. You can pay a lot more for a 223 bolt-action rifle but you probably won't get one any more accurate or durable than this one, or more fun to shoot. By modern standards this rifle is a working man's rifle. It's modestly priced, quite good looking, has good handling qualities and is a perfect low-cost mate for the 223 cartridge. So, if you want a light sporter for crows, fox, woodchucks and prairie dogs you should take a look at this one.

There are a number of features I like about this rifle. I like the stock a lot. Of course, if it were made of walnut I would like it more. I

like the barrel size and contour, and the magazine with its hinged floorplate. I couldn't ask for a better one. Lock time is right there with the best. I have no quarrel with the bolt guide or the fully recessed bolt face, or any part of the ignition system. That the entire action is all steel is a plus with me. Another plus is the generous checkering done on the stock, and the absence of white spacers. The trigger mechanism I find little fault with; it seems to be well made and I believe that time will prove that it is.

There are two things I do not much care for. One is the tiny extractor. Could it not have been beefed up a bit? The other thing is the safety. As mentioned earlier I can do without it. To begin with, I believe a safety should lock the striker or firing pin. The safety cam is also not to my liking—it should have been placed to lock the sear instead of the trigger. I can foresee shooters who always rely on it having problems with it if they do much shooting. I also do not like the rather flattish safety button. This rifle needs a safety button as on the Remington M700, one that rotates and that can be manipulated with cold or gloved fingers, and one that also locks the sear or striker. I would also prefer a rotary safety as on the Weatherby Vanguard. It can be adjusted to minimum backlash. The bolt handle on this rifle is by far the best safety, as explained earlier in this chapter.



THE ITHACA GUN Company of Ithaca, N.Y., is best remembered for the double barreled shotguns they once manufactured. If your father or grandfather was a waterfowl or upland bird hunter he might have used one. If he also enjoyed the sport of trap shooting he might have started the game with an Ithaca single barrel trap gun. And in recent years the shotgun that has kept the Ithaca name talked about among hunters and users of slide-action shotguns is the Ithaca Model 37 Featherweight. Up until about 1958 Ithaca never bothered with a rifle, but in that year they introduced the Model X5 Lightning, a semi-automatic 22 rimfire which remained in production only a few years. Then they introduced the Model 49 single shot 22, and after that the Model 72 lever action repeater. But the Ithaca rifle that interested me most was the LSA-55, a centerfire bolt action—it is this rifle which is the subject of this chapter.

While the LSA-55 has ITHACA GUN CO. stamped on it, it is really not an Ithaca at all. Rather, it is a gun that was made for them by a Finnish firm. Probably Ithaca had no part in the design and development of the LSA-55 action. Anyway, this rifle was manufactured by Oy Tikkakoski AB, Tikkakoski, Finland. Ithaca put it into their line of firearms in 1969. Several models or styles of it were made and they were as follows:

LSA-55 Standard Grade—22" barrel in calibers 222, 22-250, 243, 6mm, and 308. Plain walnut stock with raised comb, checkered grip and forend, sling swivel studs, adjustable open sights and black plastic buttplate and grip cap.

LSA-55 Deluxe—Same as Standard Grade except high luster polish and blue, no open sights, skip-line checkering, rosewood forend tip and grip cap, cheekpiece with roll-over comb and scope mounts.

LSA-55 Heavy Barrel—23" heavy barrel, beavertail forend, no sights, and in 222 and 22-250 caliber only.

LSA-65 Standard Grade—About the same as the LSA-55 Standard Grade except heavier stock and in calibers 25-06, 270 and 30-06 only.

LSA-65 Deluxe—Same as LSA-65 Standard Grade but with features of the LSA-55 Deluxe.

The LSA-55 Rifle

The rifle illustrated in this chapter is the Standard Grade LSA-55. It has a 22" sporter weight tapered barrel with a muzzle diameter of .643". The front sight is a bead sight dovetailed on a ramp base which has a detachable hood. Two screws are used to attach the windage and elevation rear open sight to the barrel—a screwdriver is needed to adjust it. The stock is of plain walnut with a raised comb and no cheekpiece. The pistol grip is well curved and placed in relationship to the trigger, and sized for an average-size adult man's hand. On the right side of it is a palm swell. Hand cut checkering areas on the sides of the grip and forend improve the appearance of the otherwise plain stock. It is fitted with quick-detachable sling swivel studs and a black plastic buttplate and pistol grip cap. The surface of the stock is sanded very level and smooth, and a glossy varnish type finish is given to it.

The action of the LSA-55 is a turnbolt with dual-opposed forward locking lugs, single-stage trigger and detachable single-column box magazine. It is an all-steel action with all parts except the bolt and the follower given a blue-black finish. The bolt and the follower are highly polished and left bright. My LSA-55 in 22-250 caliber weighs 7.25 pounds. It is an attractive rifle, well made and finished.

The Action

The receiver is of one-piece construction and could have been machined from a solid billet or machine finished from an investment casting. I am not sure which, although I suspect it is the latter. It is flat bottomed and flat sided with an integral recoil lug below the receiver ring and a box below the tang to accept the trigger housing and the head of the rear guard screw. Both the receiver ring and the bridge are also flat, with the surfaces between this flat and the receiver sides rounded. The top flats are matted and are the same height over the bore line. Holes are drilled and tapped in these flats for American scope bases.

In addition, grooves are cut at the sides of these flats so that they become integral bases for the special LSA-55 clamp-on mounts. The

receiver is 7.25" long and 1.180" in width. The receiver ring is 1.660" in length, the ejection port 2.880", and the bridge 1.160".

An unusual feature of this action is that the magazine opening in the receiver is slightly to the left of bore center. Why this was done I am not sure, but by doing it this way the right receiver rail is greatly strengthened. It is very possible that this action has more metal in the right rail than any turnbolt action of its size and weight having dual-opposed forward locking lugs. It is a very stiff action, and I might add, a very neat one.

The bolt appears to be of one-piece construction. Dual-opposed locking lugs on its forward end lock in front of shoulders machined inside the receiver ring. The bolt face is recessed for the cartridge head and on the outer edge of it is the common plunger-type ejector. A claw-type extractor is fitted in a slot in the head of the bolt and it is held in place and tensioned by a spring-backed plunger. Its pointed hook extends forward of the face of the bolt. The barrel is threaded into the receiver, and it has a face that is shaped to accommodate the extended extractor hook. Instead of being flat, recessed or coned, the face of the LSA-55 barrel has a reverse cone, like the outside of a volcanic coned mountain. It is an odd arrangement but as long as the cartridges are fed properly into the chamber I see nothing wrong with it. Perhaps the makers wanted to avoid duplicating the breeching used by Sako.

The swept-back bolt handle with its flattened ball is part of a collar that surrounds the rear end of the bolt with the root of the handle serving as the safety lug by fitting in a notch in the receiver. The collar has a cocking cam notch cut into it. Between this collar and the front locking lugs the bolt is a stretch of smooth and polished steel.

To achieve a bind-free and smooth bolt operation the LSA-55 action has a bolt guide not unlike that of the Savage 110C. It is a groove in the right locking lug that engages

(Above) Weighing only 7.25 pounds, the LSA-55 was Ithaca's first entry into the centerfire sporting rifle field. It is a Finnish-made bolt action with a detachable box magazine.



The Ithaca LSA-55 action.

over a matching rail machined the length of the bolt travel on the right receiver rail.

The firing mechanism in the LSA-55 bolt is as simple as those in the Remington M722 and Sako bolts comprising largely of a one-piece firing pin or striker, coil mainspring, bolt sleeve and cocking cam. The tenon on the front of the bolt sleeve which fits into the bolt has a small lip on it which fits in a groove inside the bolt, and this holds the sleeve and the rest of the firing mechanism in place. The cocking cam is threaded to the rear of the firing pin and locked by a set screw. With the mainspring and bolt sleeve in place on the firing pin, and the cocking cam in place, the entire assembly is held in the bolt by the bolt sleeve.

Provision is made in the notch for the bolt han-

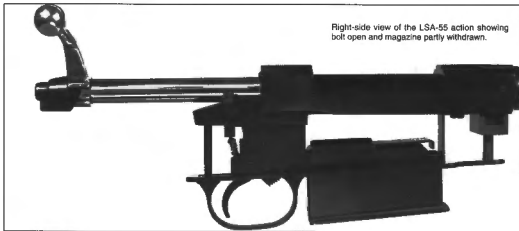
dle to cam the bolt fully closed on lowering the bolt handle, and to supply initial extraction power on the uplift of the handle. This last is accomplished by a ball-ended stationary pin fitted in the receiver at a point to contact the bolt handle as it is swung upwards to cam the bolt back.

The bolt-stop is a simple pivotal part which is mounted on the left rear of the receiver on a pin in the receiver wall. The front end of it projects into the locking lug raceway, and this stops the rearward movement of the bolt when the locking lug contacts it.

Gas vent holes are provided in this action. There is a small hole entirely through the upper part of the locking lug recess in the receiver ring so that any gases entering in that area can escape. This does little good howev-

er, since the gases will escape through the locking lug raceways far easier. Gases getting inside the bolt can escape through a hole in the right front side of the bolt.

The trigger mechanism is built into a steel housing and it is held in place in a recess in the receiver by two cross-pins. Fitted inside this housing on pins are the trigger and the sear, with the end of the sear projecting into the cocking cam raceway in the receiver. Both the sear and the trigger are provided with springs. A single adjustment screw is provided to adjust weight of pull. This screw is positioned inside the lower front of the housing and is accessible through a hole in the front of the housing. Unless the stock is removed, you will need a small ratchet offset screwdriver to turn it. Turning this screw clock-



Right-side view of the LSA-55 action showing bolt open and magazine partly withdrawn.

wise increases the weight of pull.

Of the pivoting type, the safety is mounted on the rear of the trigger housing. It is provided On and Off tension by a stiff spring mounted below it. Tipped to the rear the safety locks the trigger and bolt.

The trigger guard plate is a piece of strap steel with openings cut into it for the magazine, trigger and trigger guard bow. It is inletted into the stock about $1/4$ " below the stock surface, this done to allow the bottom of the detachable box magazine to lie flush with the stock. The magazine latch and spring are also located on this strap. The trigger guard bow is a separate part. With the trigger guard plate in place, and

the magazine latch and the guard bow in place, a small screw at an angle through the front of the bow, and threading into the bottom of the trigger housing, holds the front of the bow in place. Then, with the barrel and receiver assembly in place, the two guard screws do the rest; the front one through the front of the strap and threaded into the recoil lug, and the rear one through the tang and threading into the rear of the steel trigger guard bow.

The magazine box is made of sheet steel folded into a box. Attached to the bottom of it is a thicker piece of flat steel, and on the open top the edges of the box are curved inward to form lips to hold cartridges in place. A regular W-shaped follower spring provides the upward tension to the flat follower. The front of the trigger housing serves as the guide to the rear of the magazine, and an L-shaped steel bracket screwed to the receiver serves as the front guide. The stock serves as the side guides. As mentioned earlier, the magazine is set slightly to the left of center, and the hole in the trigger guard plate through the stock is similarly offset. No arrangement is provided to automatically push the magazine out when the latch is released.

The recoil lug on the bottom of the receiver is very small, but this is compensated for by the use of a piece of channel iron that fits over it and which is inletted into the stock. Thus this piece of channel serves as the recoil plate and affords a large area for bottoming.

On my particular rifle the factory used thin metal shims between the receiver and the stock; two half-round ones under the end of the tang, and two rectangular ones under the recoil lug plate. I am not sure of the reason why shims are used, but by their use it is an easy matter to establish a two-point bedding of the action in the stock and raise the barrel to free-float it. The barrel is a free-floating one; it does not contact the forend channel at any point—a good idea.

Markings

The Ithaca LSA-55 rifle I have is marked as follows: On the left side of the receiver is stamped:

LSA-55

Stamped on the left side of the barrel in three lines is:

CAL. .22-250 REM.
ITHACA GUN CO., ITHACA, N.Y.
MADE IN FINLAND

On the right side of the barrel is:
BOFORS BARREL STEEL

The serial number is stamped on the left side of the receiver ring, and the last three digits of it are stamped under the bolt handle. The three digits in front of the serial number are the code numbers for the LSA-55 model.

Takedown and Assembly

Open the bolt and remove the magazine to make certain the rifle is unloaded.

Left side of the LSA-55 rifle.



Top view of the LSA-55 action showing the matted top flats on the receiver and the grooves for the Finnish-made scope mounts.



Remove the bolt by depressing the bolt-stop on the left of the receiver and pulling the bolt out.

To remove the firing mechanism from the bolt turn the bolt sleeve clockwise until it pops out. Do not attempt to disassemble the firing pin parts unless it is absolutely necessary to do so. The keys for doing this are the two small set screws (one locks the other) threaded into a hole in the threaded end of the firing pin. Both set screws are accessible through the hole in the cocking cam. Reassemble the firing mechanism into the bolt in reverse order.

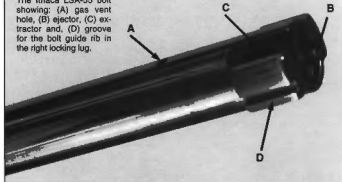
To remove the barrel and receiver assembly from the stock proceed as follows: Remove the magazine. Turn out the small screw located in the front of the trigger guard bow. Turn out the front guard screw and lift out the trigger guard plate and magazine catch. Lift the barrel and receiver from the stock. The recoil lug plate and shim will lie loose in the stock. Reassemble in reverse order.

To remove the trigger mechanism drive out the two pins that hold it in place. Do not attempt to disassemble this mechanism unless you have had experience in this work. Reassemble in reverse order.

Comments

I was favorably impressed on seeing and handling the Ithaca LSA-55 rifle for the first time. It was well finished. Metal surfaces were smooth, well polished and blued; the bolt, which was bright, was perfectly machined and polished, and it opened and closed with very little effort. I liked both the way the receiver was shaped and the matting on top of the receiver ring and bridge. I did not like the grooves made for foreign mounts

The Ithaca LSA-55 bolt showing: (A) gas vent hole, (B) ejector, (C) extractor and, (D) groove for the bolt guide rib in the right locking lug.



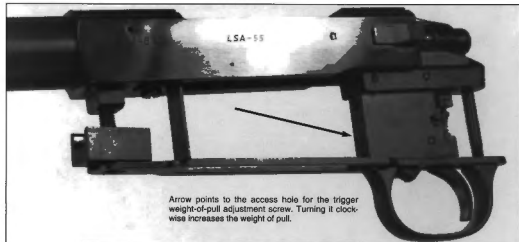
or the flattened bolt handle ball, nor did I like the bolt-stop and the safety. There was ample camming motion on the initial opening and final closing of the bolt. I did not much care for the odd shape of the barrel face. The trigger pull was good and I do not mind that the trigger adjustment screw is a bit difficult to get at. The trigger position in the guard bow is good. On taking the rifle and action apart I was pleased to find every part made of steel. The magazine was ok, but it was not easy to remove and replace—this could have been made better.

As for the stock, for the most part I liked it. I thought that the forend could have been about 2" shorter, the butt section could have been a trifle fuller, and the raised comb left off. I liked the pistol grip very much as it was the first one made with a palm swell that fitted me. I would sooner have a pistol grip without

that swell, but if the grip is made with one, I want it to fit me. Except for the problem of removing and replacing the magazine, the LSA-55 rifle is well designed, appointed, made and finished.

In 308-caliber and used as is, or with a low-powered scope, the LSA-55 would be an ideal rifle for the deer hunter. In 222-caliber and fitted with a 6x or 8x scope, it would be ideal for varmints up to 200 yards or so. For serious varmint shooting at longer ranges, the LSA-55 with heavy barrel would be a good choice.

According to the information I have, Ithaca discontinued the LSA-55 rifle about 1976, about the same time they began selling another centerfire turnbolt rifle—the Ithaca CF2, a rifle made in England by BSA. The BSA CF2 rifles and action are described in another part of this book.

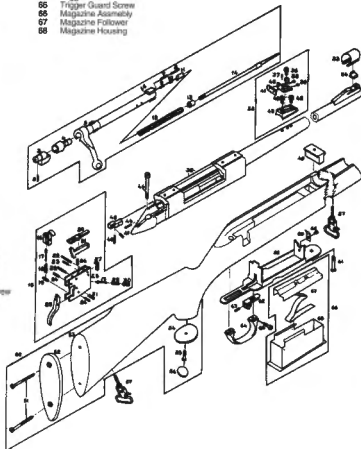


Arrow points to the access hole for the trigger weight-of-pull adjustment screw. Turning it clockwise increases the weight of pull.

Parts Legend

- | | | | |
|----|---------------------------------|----|-------------------------------|
| 1 | Breech Bolt Assembly | 57 | Swivel Assembly |
| 2 | Firing Pin Nut Pin | 58 | Floppplate |
| 3 | Firing Pin Nut | 59 | Magazine Support Spring |
| 4 | Breech Bolt Sleeve | 60 | Magazine Support Spring Screw |
| 5 | Bolt | 61 | Front Stock Screw |
| 6 | Ejector Retainer Pin | 62 | Magazine Lock |
| 7 | Ejector Spring | 63 | Magazine Lock Spring |
| 8 | Ejector | 64 | Trigger Guard |
| 9 | Extractor Spring | 65 | Trigger Guard Screw |
| 10 | Extractor Spring Plunger | 66 | Magazine Assembly |
| 11 | Extractor | 67 | Magazine Follower |
| 12 | Firing Pin Spring | 68 | Magazine Housing |
| 13 | Firing Pin Collar | | |
| 14 | Firing Pin | | |
| 15 | Trigger Plate Assembly | | |
| 16 | Thumb Safety | | |
| 17 | Spring Guide | | |
| 18 | Safety Spring | | |
| 19 | Safety Spring Support | | |
| 20 | Safety Guide | | |
| 21 | Seal | | |
| 22 | Trigger Plate Assembly | | |
| 23 | Attaching Pin | | |
| 24 | Seal Pin | | |
| 25 | Thumb Safety Pin | | |
| 26 | Trigger | | |
| 27 | Seal Spring | | |
| 28 | Safety Bar | | |
| 29 | Trigger Housing | | |
| 30 | Trigger Spring | | |
| 31 | Trigger Adjusting Screw | | |
| 32 | Trigger Adjusting Pin | | |
| 33 | Barreled Receiver | | |
| 34 | Front Sight Hood | | |
| 35 | Front Sight | | |
| 36 | Rear Sight Assembly | | |
| 37 | Rear Sight Adjusting Screw | | |
| 38 | Rear Sight Base Locking Pin | | |
| 39 | Rear Sight Adjusting Screw | | |
| 40 | Washer | | |
| 41 | Rear Sight Leaf Adjusting Screw | | |
| 42 | Rear Sight Leaf | | |
| 43 | Rear Sight Base Screw | | |
| 44 | Rear Sight Base | | |
| 45 | Rear Sight Screw | | |
| 46 | Bolt-stop | | |
| 47 | Detaching Pin | | |
| 48 | Bolt-stop Spring | | |
| 49 | Bolt-stop Pin | | |
| 50 | Recoil Shoulder | | |
| 51 | Stock Assembly | | |
| 52 | Buttplate Screw | | |
| 53 | Buttplate | | |
| 54 | Stock | | |
| 55 | Pistol Grip Cap | | |
| 56 | Grip Cap Screw | | |

Ithaca LSA-65 Rifle



Dimensional Action Specifications

Receiver length	7.250"
Receiver width	1.180"
Bolt diameter	.593"
Bolt travel	3.830"
Striker travel	.225"

General Specifications

Type	Bolt action repeater.
Receiver	One-piece machined steel construction, solid bridge, grooved, drilled and tapped for scope mounts.
Bolt	One-piece, solid dual-opposed forward locking lugs, bolt handle root serves as safety lug.
Magazine	Detachable, single-column box magazine.
Trigger	Single-stage, adjustable.
Safety	Pivotal, locks trigger and bolt.
Extractor	Claw type.
Ejector	Spring backed plunger in bolt face recess.
Bolt-stop	Pivotal, mounted on left side of receiver.



WHEN I SAW the first two five-shot groups fired with my Model 82 Kimber Special Grade Hornet rifle I knew immediately that it was the most accurate 22 Hornet I had ever owned. Not only that, but it was also the best looking and handling Hornet rifle that had ever come my way. The rifle I am referring to is the one shown here, one of 300 of a special series, the "S" series, made by Kimber of Oregon in Clackamas, Oregon. It is the quality of the stock wood and workmanship expended on it that makes this an "S" or Special series rifle, and it is not far from being a Griffin & Howe classic of fifty years ago. Anyway, even if this particular rifle had been fitted with a regular Kimber Classic or Cascade stock of plainer walnut it would still be an ideal Hornet in size, shape, weight, etc.

The assembled Kimber M82 Hornet barreled action weighs close to 4.75 pounds, and in a Kimber stock the complete rifle weighs 7 pounds, give or take a few ounces. I consider this ideal for the Hornet caliber. The barrel is 22" long and this length is also ideal. It has a straight taper measuring .962" at the breech and .600" at the muzzle, and in my estimation is perfect in size and weight. The action is 7.187" in length with the receiver 1.152" in diameter, and this too is to my liking. The trigger is as good as any shooter could want.

The receiver is round and of one-piece construction with the barrel threaded into its front end. It is machined from a solid block of chrome-moly steel. Its loading/ejection port is 1.735" long and the rear end of the receiver is nicely slanted to blend smoothly with the top line of the pistol grip. Two deep scope mounting grooves extend nearly the full length of the receiver top, and a cross pin between the grooves near the front of the receiver ring provides a stop

for the front scope mount ring. This prevents the scope from sliding forward from the recoil of the rifle. A round recoil lug is dovetailed into the barrel.

The body of the bolt is of one-piece construction and it is almost as long as the distance from barrel breech to the rear of the receiver. The bolt handle and locking lug are integral with the bolt sleeve/cap. A deep notch in the right rear of the receiver to accept the base of the bolt handle, and a machined recess at about eight o'clock to accept the second locking lug, serve to lock the bolt in the receiver when the bolt handle is turned down. Grooves milled lengthwise in the bottom front half of the non-rotating bolt body override the magazine lips to feed cartridges out of the magazine and into the chamber. On either side of the bolt head are narrow grooves to accept the right and left extractors, with the right one having a claw to extract a case from the chamber and the left one with a dull claw to assist in ejection. A flat C-shape spring fitted in a groove in the bolt not only supplies tension to the two extractors but also serves to hold them in place. This is a novel and effective arrangement, although it does spoil the looks of the bolt and reminds me of the spring-clip extractor system used on some of the cheapest 22 rimfire rifles made by Mossberg and Marlin. The face of the bolt of the Kimber is recessed for the rim of the Hornet cartridge, although the lower half of it is cut away to allow the rim to slip behind the extractor claws as it is fed out of the magazine. Two small notches cut into the flat face of the barrel breech allow entrance of the extractor claws when the bolt is closed.

Located in a slot cut into the left side of the receiver, and pivoted on a pin and tensioned by a small coil spring, is the bolt-

stop. The tip of this part projects into the receiver and rides in a lengthwise groove cut into the bolt body to stop the bolt when the stop contacts the end of the groove. The rear end of the bolt body is turned down and over this is fitted the combination bolt sleeve/cap/cocking cam, and the bolt handle. The bolt handle has a low profile to clear the eyepiece of a scope. Inside the machined chrome-moly bolt body is the one-piece firing pin, a coil mainspring, a threaded bushing at the rear of the bolt to compress the mainspring and a cocking cam guide on the rear of the firing pin. A pin with a socket-head partly smooth and partly threaded serves to hold the firing pin and cocking cam guide together. At the same time this becomes the part which cocks the firing pin and holds the bolt handle sleeve/cap on the bolt body. The threads on this small part are left-handed to prevent it from loosening and turning when the bolt handle is lifted to open the action. It is an ingenious arrangement using a minimum of parts for the cocking and firing mechanism. On cocking the action, the sear engages in front of the shoulder near the center of the firing pin, the same shoulder against which the mainspring pushes. The purpose of the cocking cam guide is to prevent the firing pin from turning as the bolt handle is raised, when the firing pin is being cocked.

Inletted precisely into the bottom of the stock is the one-piece steel trigger guard. This part appears to have been machined and finished from an investment casting, as I

(Above) The Kimber centerfire Model 82 Special limited production model. The Kimber M82 rifle was available in calibers 22 Hornet, 218 Bee and 25-20 centerfire.



Left side of the Kimber Model 82 Special grade.

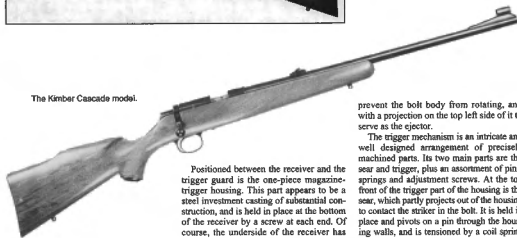


Left side of the Kimber Classic stock.



Left side of the Kimber Cascade stock.

The Kimber Cascade model.



suppose some of the other parts are. The trigger guard bow is nicely shaped. At each end of the guard there are holes for the front and rear oval-headed guard screws, which when in place hold the barrel and action assembly securely in the stock. The recoil lug is merely a round stud dovetailed into the bottom breech-end of the barrel.

Positioned between the receiver and the trigger guard is the one-piece magazine-trigger housing. This part appears to be a steel investment casting of substantial construction, and is held in place at the bottom of the receiver by a screw at each end. Of course, the underside of the receiver has openings machined into it for the magazine well, ejector and sear. At the rear of the magazine well in this housing is the magazine catch, held in place and pivoting on a pin through the housing walls and there tensioned by a small coil spring. Just above this catch and projecting above the housing is a block of metal held in place in the housing by a screw, with the block serving to

prevent the bolt body from rotating, and with a projection on the top left side of it to serve as the ejector.

The trigger mechanism is an intricate and well designed arrangement of precisely machined parts. Its two main parts are the sear and trigger, plus an assortment of pins, springs and adjustment screws. At the top front of the trigger part of the housing is the sear, which partly projects out of the housing to contact the striker in the bolt. It is held in place and pivots on a pin through the housing walls, and is tensioned by a coil spring between the front end of it and the receiver. Positioned below and to the rear of the sear is the trigger with its well-shaped finger piece, and it pivots on a pin.

Threaded into a shelf inside the housing at the front of the trigger are two adjustment screws; the one farthest to the rear and combined with a coil spring is the weight-of-pull adjustment; the one ahead and above it is the



The right side of the Kimber M82 action. The M82B differs outwardly only in that its bolt handle is swept back.

over-travel adjustment. A screw through the housing at this point locks both of these adjustment screws. The third trigger adjustment screw, that regulates the amount of sear engagement or take-up, is located at the rear of the housing. When the Kimber rifle is assembled and shipped from the factory, all three of these screws have been properly adjusted to give minimum safe trigger take-up, over-travel, and a weight of pull of close to three pounds. There is no

need to do any further adjusting. However, if any adjusting is to be done, the barrel and action assembly must be removed from the stock.

There is still another adjustment screw connected with the trigger mechanism, located at the rear of the trigger and below the sear engagement adjustment screw. It is an important one as we shall see. The safety button, or wheel, as some writers have called it, is mounted on the right rear side

of the receiver and rotates on a screw. The safety bolt is positioned through holes in the trigger housing walls and is rotated to lock the trigger when the safety is pivoted back by a pin and spring positioned between it and the safety. This last adjustment screw is threaded through the safety bolt, the end of which contacts a shoulder on the trigger when the safety is engaged. This screw is important in that it is the adjustment to lock the trigger when the



The M82 action, open.



The left side of the M82 action.

safety is engaged, and should wear occur or the trigger be abused, this screw can be adjusted so no movement of the trigger is possible when the safety is engaged. Of course, this screw has also been properly adjusted at the factory, and under normal usage may never need adjusting again.

The sear engagement adjustment screw must never be tampered with as any adjustment to it will upset the adjustment to the safety, and either make it inoperable or unsafe. The safety locks only the trigger and not the sear or bolt.

The Kimber Hornet magazine is a heavy sheet metal stamping formed into a box with a slide-off bottom. The follower is made of aluminum, the only part of this action not made of steel. Its follower spring is the usual zig-zag type made of spring wire. It is a well made and sturdy magazine of three-round capacity, and when in place is flush with the bottom of the stock.

There is much about the design of the Kimber action that reminds me of the Winchester Model 52 action, like the bolt handle and the locking lug arrangement. As with the M52 Winchester, the Kimber locking lugs, which include the base of the bolt handle, lock up into the receiver the same way. I might add here that the bolt handle, sleeve and locking lugs of the Anschütz are also nearly identical to the Kimber bolt handle sleeve. I am not sure which was designed first, the Anschütz or the Winchester M52, but it seems likely that the designer of the Kimber was influenced by one of them.

There are some features about this Kimber Hornet rifle I do not like. I would like this rifle better had the loading/ejection port

been made a bit longer at the rear and the upper edge of it beveled off. I would have liked it better, too, had Kimber incorporated a bolt handle sleeve lock to keep the bolt handle locked when the bolt is open. I am sure that some shooters will find it annoying that the bolt handle, if bumped when the action is opened, can easily turn down and prevent the bolt from being closed unless first turned up into position again. This bolt should have been fitted with a bolt sleeve lock similar to that used on the Colt Sauer action.

Another minor annoyance may also become evident in time, and that is with the removal of the magazine. As made, the removal of the magazine is solely dependent on gravity and this works well. However, what if the magazine becomes grimy or slightly damaged, or a weed seed gets jammed alongside of it and gravity is not enough to remove it? Kimber has closely copied the general shape and form of the Model 52 Winchester trigger guard, to include the quarter-moon dips in it at each side of the magazine opening. However, unlike the M52 stock which has matching concave cuts at these points to provide finger room to grasp the magazine should it need to be pulled or lifted out, my Kimber stock does not have these dips. This makes it all but impossible to grasp the magazine.

I also had a problem with the rear sight on my Kimber Hornet. The first thing I noticed on handling the rifle was the very sharp corners on the rear sight leaves on which I scratched a finger. These four corners should have been rounded off slightly. After that incident a larger problem loomed when I attempted to mount a Weaver K6 scope on

the rifle. To do that required the removal of the rear sight and base and would have been an easy task had the base been attached with two exposed screws, such as the bases made by Lyman and Marbles. Kimber chose to use a base with one mounting screw, with that screw under the dovetail of the leaf sight, requiring the removal of the sight before the base can be removed. With the base protected with sheet copper and held in a vise, I drove the sight out. It was a very tight fit and I knew that I would need to do some file work before being able to replace it again. After all that, I found that the Weaver K6 scope looked out of place on the rifle and decided to use one with a smaller objective lens which would not interfere with the rear sight.

I have no objection to the receiver being grooved for scope mounting, but I can't fully understand why these grooves were not made of standard width to accept tip-off mounts. In the pictures I saw of Kimber rifles with scopes in the Kimber-Brownell mounts, these mounts looked very good to me. Since they were the only ones available to fit the grooves in the Kimber receiver, I ordered a pair. I would much rather have the receiver drilled and tapped for Redfield or Buehler mounts instead of being grooved. They would have been just as good, if not better, and cost less than the Kimber-Brownell mounts. Just the same, the K-B mounts proved to be extremely light and nicely finished. Besides the side-lever, only one screw showed. One of the side-lever screws had a right-hand twist, while the other to be used as the rear ring had a left-hand thread. Both of these screws were a very sloppy fit, as though an over-sized tap was



used to cut the threads in the hole. A person with a more powerful thumb than I have could easily strip the threads on tightening the mounts on the receiver. Other than the sloppy threads, the mount rings were well made.

Even by closely following the instructions which came with these mounts, I had some difficulty installing them on the scope and on the rifle. Once installed, however, this mount certainly appeared very sturdy. I disliked the fact that the base of the front ring projected well over the loading/ejection port. This could have been eliminated by machining a recess in the front of the ring's dovetail to override the cross stop pin in the receiver, or by beveling off the lower rear corner of the base itself.

If the levers are properly adjusted this mount allows easy and quick removal of the scope from the rifle. This requires opening the bolt, turning the levers 180 degrees, and sliding the scope to the rear. However, reinstalling the scope is an entirely different matter and you might even do a little cussing before getting it back in place. One thing is sure, and that is that you cannot do it with one hand; even with both hands you can't do it easily or quickly. And you probably can't do it at all with cold hands, while wearing mittens or gloves, or without looking at what you are doing. You will have several problems, one being that the levers will likely turn too far one way or the other and you will have to start all over again; the bolt will close and you can't get the mounts to slip into place in the receiver grooves; you can't easily get both rings started into the grooves at the same time, and more. I solved part of the problem by inserting a small coil spring (.115" diameter and .250" long) into the socket of the front clamp screw in each mount ring to hold the front end of the mount clamps outward. This put some tension on the levers to keep them from turning easily. Even so, the mounts are not easily guided into the receiver grooves.

I believe this mount would have been much better had it been made with knurled clamp screws instead of levers. If this had been done, there would have been no need for right- and left-hand threads, and if two springs were placed between the mount and clamp the mounts could be tipped off and on rather than slid off and on. Making the mounts this way would surely be cheaper and better.

Except for the somewhat longer action, longer bolt travel, and the larger magazine and ejection port, the Kimber M82 Hornet action and rifle are the same as the 22 Long Rifle and 22 WMR M82 rifles. Especially attractive are the stocks. There were three



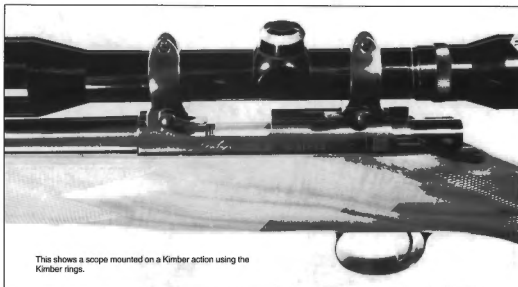
Kimber (Brownell) double-lever scope mounts. The receivers of Kimber actions are grooved to accept these mounts. No bases are needed.

basic styles: the Classic, which has no raised comb or cheekpiece; the Cascade, which has a cheekpiece with raised comb; and the Super Grade with straight comb and cheekpiece. The best wood and checkering come with the Super Grade, but very select walnut is also used for the Cascade and Classic models, along with a generous amount of well done checkering. All the stocks are nicely shaped and finished, and fitted with checkered steel buttplates and pistol grip caps. All are adult sized. On special order, barreled actions in all calibers available, were available for those who wanted to make the stock and save some money, or to make the stock somewhat different than the factory version. However, to make a stock that is better looking than the factory unit would not be easy. Anyway, for those who want to duplicate the size and dimensions of the Super Grade stock, I will list the guiding dimensions lat-

er. To begin, you should use the Niedner checkered steel buttplate and pistol grip cap and size the butt and pistol grip accordingly.

Disassembly and Reassembly

To disassemble the Kimber M82 rifle proceed as follows: First check the rifle to make sure it is not loaded. Remove the bolt by depressing the bolt-stop at the left rear of the receiver, raise the bolt handle and withdraw the bolt from receiver. Remove the magazine by drawing back the magazine catch and letting the magazine fall out. To remove the barreled action from the stock, turn out the rear and front guard screws in that order and carefully lift barrel and action from the stock. Remove the trigger guard from stock. To remove the trigger and magazine housing from the action, turn out the rear screw of that unit and then turn out the front one, which is a hollow-headed screw into which



This shows a scope mounted on a Kimber action using the Kimber rings.

the front guard screw is threaded. Both these screws are supplied with lock washers, the thick one for the rear screw. The magazine catch and bolt guide can then be removed from the housing by driving out a pin and turning out a screw. Unless you are skilled and experienced with trigger work, do not attempt to disassemble the trigger and safety mechanism. It is also advisable to never make any adjustments to the trigger. Reassemble in reverse order.

To disassemble the bolt, first remove it from the action and turn the bolt handle down to lower the firing pin. Then use the correct Allen wrench to remove the cocking cam screw from the rear of the firing pin assembly. Remember, this screw has a left-hand thread. When this screw has been removed, slide the bolt handle/sleeve off the bolt body, and pull the cocking cam guide off the firing pin. A special hollow spanner wrench is required to remove the threaded mainspring retainer bushing, and with the bushing removed the mainspring and firing pin can be withdrawn. To remove the extractors, slip the C-spring from the bolt and lift out these parts. Reassemble in reverse order.

To disassemble the magazine, merely slide off the bottom plate and the follower spring and follower can be removed.

Markings

My Kimber M82 Hornet rifle is stamped on the left side of the receiver:

HS 88 KIMBER MODEL 82 "S" SERIES

On top of the barrel is:

KIMBER OF OREGON, INC., CLACKAMAS, OREGON, U.S.A.

"CALIBER 22 HORNET" is stamped on the left barrel breech. The "Kimber" on the receiver is in script and the "HS 88" is the serial number, this rifle being the eighty-eighth of 300 made in this series.

Comments

There are many things about the M82 Kimber Hornet rifle that I like. I could not wish for a Hornet rifle with better balance, size and weight than this one. The barrel length, size and weight are also superb. Perfect, too, is the stock, although for someone with smaller hands than mine the pistol grip could have been made shorter, slimmer and closer to the trigger. I have always admired the little 22 Hornet cartridge, and in this rifle it is completely at home and performs in it as in no other Hornet rifle I have ever used. I have no quarrel with the trigger or safety, and I particularly like the well constructed magazine and catch and that both are flush with the bottom of the stock. The lock time is very fast, feeding and ejection are flawless. What more could one ask?

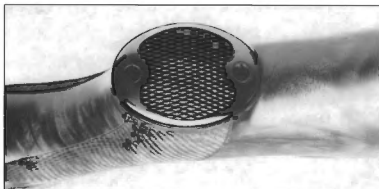
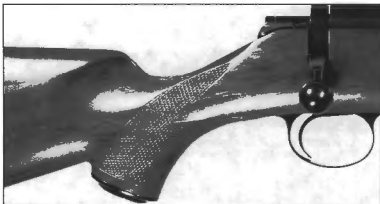
As for me, I could ask for a better mounting of the rear sight or that there be no sights on the barrel at all. I would have liked the receiver drilled and tapped for scope mounts,

and the grooves omitted or improved along the lines mentioned earlier. I would also like my rifle to have a bolt sleeve lock and perhaps a bolt handle of different shape to reduce the notch in the stock or requiring less uplift. I suppose I ought to consider these dislikes not so much as faults but as my own prejudices or dislikes of these features. Still, my rifle looks so good, handles so well and shoots so good that I should be happy and satisfied with it, and that I surely am.

Kimber of Oregon, Inc., began their rifle manufacturing business about 1980 with high hopes of success. They made their rifles on a very excellent action, used the best barrels available and stocked the rifles with top grades of Claro walnut. In every respect their rifles were the finest obtainable. Perhaps they were over ambitious by offering so many models, and no doubt only a very few of certain models and calibers were made. If you have a Kimber rifle you can prize it highly. But their story ends in about 1990 when it was announced that they had ceased manufacturing.

In the September, 1994, issue of *American Rifleman* there is a "Dope Bag" report on the Kimber Model 82C 22 rimfire sporting rifle. Therein is stated that Kimber is under new ownership and management with the name changed to Kimber of America, and that the factory is located in a building next door to the former Kimber plant. The Kimber M82C has a few minor changes

This shows the well-shaped Kimber pistol grip. All models of the Kimber rifles are expertly checked and are fitted with grip caps.



Skeleton pistol grip cap—an option of the 1986 Super America, Kimber's top of the line super-grade model.

made to the rifle and action, but that is not important here. What is important is that the firm has no plans to enter the centerfire market and so this chapter stands as written. If you have a Kimber M82 Hornet you have one of the finest 22 Hornets ever made.

Included in this chapter is a factory chart listing the specifications of all the different original Kimber rifles made. This chart should be of great interest to all those who collect Kimbers. If in time you collect all of the different models, calibers and variations you will have one very fine and valuable collection.

Dimensional Action Specifications

Action length	7.187"
Receiver diameter	1.152"
Bolt diameter	.625"
Bolt travel	2.000"

Dimensional Stock Specifications

Drop at heel	1 1/16"
Drop at comb (comb drop is measured from center of bore or top line of forend)	1/8"
Length of pull (measured from trigger)	13 1/16"
Overall length	29 1/4"
Circumference at small of pistol grip	4 7/8"
Width at small of pistol grip	1 7/8"
Width over the action	1 7/8"
Width at forearm	1 11/16"
Depth at forearm tip	1 1/16"

General Specifications

Type	Tumbolt, operated by bolt handle.
Receiver	Machined from solid block of chrome-moly steel.
Bolt	Two-piece bolt non-rotating bolt body, separate bolt handle (locking lugs) bolt sleeves.
Magazine	Detachable, holds three 22 Hornet cartridges.
Trigger	Single stage, adjustable.
Safety	Rotary type, locks trigger only.
Bolt-stop	Pivoting.
Takedown	None provided, barrel threaded tightly into receiver.

The following chart lists and gives specifications of the Kimber rifles made. This chart will be valuable to the Kimber collector.

Kimber Rifles: Technical Specifications

				STOCK STYLE					ACTION				BARREL					
Model	Caliber	Barrel Weight	Right hand Left hand	Classic	Cascade	Custom Classic	Super America	Barrowall Full Length	Front Locking	Rear Locking	Repeater	Single Shot	Magazine Capacity	Weight (pounds)	Overall Length	Length (inches)	Creases	Twist (inches/turn)
82B	.22LR	Sporter	R	•	•	•	•	•	•	•			5	6½	40½	22	6	16
82B	.22LR	Varmint	R	•		•				•	•		5	7½	42½	24	6	16
82B	.22LR	Sporter	L	•		•				•	•		5	6½	40½	22	6	16
82B	.22 Hornet	Sporter	R	•	•	•	•			•	•		3	6½	40½	22	6	14
82B	.22 Hornet	Varmint	R	•		•				•	•		3	7½	42½	24	6	14
82B	.22 Hornet	Sporter	L	•		•				•	•		3	6½	40½	22	6	14
82B	.218 Bee	Varmint	R			•				•		•	N/A	7½	42½	24	6	14
82B	.25-20	Sporter	R			•				•		•	N/A	6½	40½	22	6	14
84	.223 Rem	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	12
84	.223 Rem	Varmint	R	•		•			•		•		5	7½	42½	24	6	12
84	.223 Rem	Sporter	L	•		•				•			5	6½	40½	22	6	12
84	.223 Rem	Varmint	L	•		•			•		•		5	7½	42½	24	6	12
84	.222 Rem	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	14
84	.222 Rem	Varmint	R	•		•			•		•		5	7½	42½	24	6	14
84	.222 Rem	Sporter	L	•		•				•			5	6½	40½	22	6	14
84	.222 Rem	Varmint	L	•		•			•		•		5	7½	42½	24	6	14
84	.221 Fireball	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	12
84	.221 Fireball	Varmint	R	•		•			•		•		5	7½	42½	24	6	12
84	.221 Fireball	Sporter	L	•		•			•		•		5	6½	40½	22	6	12
84	.17 Rem	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	10
84	.17 Rem	Varmint	R	•		•			•		•		5	7½	42½	24	6	10
84	.17 Rem	Sporter	L	•		•			•		•		5	6½	40½	22	6	10
84	.17 Mach IV	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	10
84	.17 Mach IV	Varmint	R	•		•			•		•		5	7½	42½	24	6	10
84	.17 Mach IV	Sporter	L	•		•			•		•		5	6½	40½	22	6	10
84	6 x 47	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	12
84	6 x 47	Varmint	R	•		•			•		•		5	7½	42½	24	6	12
84	6 x 47	Sporter	L	•		•			•		•		5	6½	40½	22	6	12
84	6 x 45	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	12
84	.223 Rem Mag	Sporter	R	•	•	•	•		•		•		5	6½	40½	22	6	12

Trigger: Triggers on all rifles are set for 2½-3½ pounds of pressure; adjustable for weight of pull and overtravel.



Kimber Model 84

TO EXPAND THEIR line of centerfire rifles to include a few longer cartridges than those already made for their M82 rifle, Kimber of Oregon had to have a longer action. To accomplish this, they redesigned the M82 action to make it longer and stronger, and this they did very successfully. Kimber already had three outstanding stock designs and these they used for this rifle. Except for certain action features, the M84 closely resembles the M82. The M84 was introduced in 1985 and it remained in production until the Kimber firm shut down, about five years later.

The additional chamberings which Kimber wanted to include in their line-up were the five members of the 222 family, which by then were well known and most were popular. They were the 17 Rem., 221 Fireball, 222 Rem., 222 Rem. Magnum and 223 Rem. In addition, their catalog listed three wildcat chamberings, the 6x47mm, 6x45mm and 17 Much IV. The 221 was developed as a pistol cartridge for Remington's XP-100 single shot, bolt-action pistol. The 222 Rem. Magnum never became very popular and what following it had quickly dissolved when the 223

was introduced, a cartridge also known as the 5.56x45, as adopted by the U.S. armed forces.

Here, briefly, is what the Kimber designers did to adapt or re-make the M82 to handle the 222 family of cartridges. The receiver was made longer, including a longer receiver ring and a longer loading port. The bolt was consequently also made longer, but it also was made with dual locking lugs on the front end, a Mauser-type extractor replaced the small claw extractor and lastly, the magazine was, of course, changed. The end result was an action not too unlike the original M82, but stronger and safer.

The following is a more detailed description of the main features of the M84:

Receiver—Machined from a solid block of chrome moly steel, the receiver is made longer than the M82's with a longer ring, longer and wider loading port, and a differently shaped magazine well opening. Inside the M84 receiver there are threads up front to receive the barrel, locking lug runways machined out the entire length of the receiver, and it's bored out behind the threads to leave plenty of metal for support shoulders for the

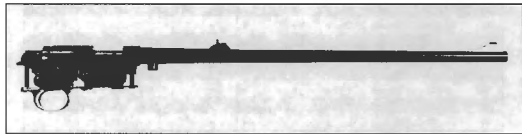
twin locking lugs on the bolt. The top of the receiver is round and drilled and tapped for scope mount bases.

Bolt—The one-piece bolt is also machined from a solid block of chrome moly steel, with dual-opposed solid locking lugs at its front end and a bolt handle at its rear. The root of the bolt handle serves as a safety lug.

Extractor—The extractor is patterned after the famed Model 98 Mauser extractor, and in the Kimber literature this action is sometimes referred to as the "Mini-Mauser." The face of the bolt is recessed for the cartridge head and, as in the Mauser M98, the rim is undercut to allow the head of a cartridge to slip under the extractor hook when it is being chambered. Many other actions such as the Springfields and Enfields have the same feature. All the same, this extractor is much stronger than the small claw extractor in the M82.

Bolt-stop—Patterned after the bolt-stops in some Mannlicher actions, the M84's is nearly

(Above) Kimber Model 84 223 Custom Classic with varmint-weight barrel.



At one time, Kimber made barreled actions available, including both the M82 and M84 models in various calibers and two weights of barrels.



Close-up view of Kimber's M84 223 Mini-Mausier.

identical to the same part in the M82, and bolt travel is stopped when the left locking lug contacts the bolt-stop.

Ejector—This small but important part is patterned after the Model 70 Winchester ejector, and is positioned in a slot in the rear left underside of the receiver.

Trigger and safety—The trigger/safety unit is the same as used in the M82 Kimber. My remarks on this trigger and safety arrangement made in the chapter on the M82

rifle apply here as well.

Magazine—Unlike the detachable single-column box magazine used in the M82 actions, the M84 has a nondetachable magazine very similar to that found in many bolt-action repeating rifles such as the Remington 700 series.

Trigger Guard—Made of steel, the trigger guard is fitted with a hinged magazine floorplate and catch. Guard screws through holes in the front and rear of the trigger guard

and threaded into the receiver secure the barreled action in the stock. The recoil lug is merely a round stud dovetailed in the bottom breech end of the barrel.

The Kimber chart in the M82 chapter lists the various specifications, different calibers and models in which the M84 Kimber was once made. It was quite an array. I never owned or used one, but if I had chose one I would have selected the varmint style in 223-caliber with a Classic stock.



IT WOULD PLEASE me if I could begin this chapter with a detailed historical rundown of not only the rifle featured here, but of its manufacturer and importer as well. For various reasons I am not able to do this, the main one being that little has been written about them that I can rely on. Anyway, it is the rifle and its action that we are interested in. As the title implies, the rifle and action covered here is Kleinguenther's Improved K15 Insta-Fire, introduced in 1982, a quality rifle made in Germany by Voere and imported and distributed in the U.S. by Kleinguenther, Inc. If you have never heard of the rifle or of the manufacturer or importer, it is not surprising, as all three are more or less newcomers on the scene. And in 1994 I can find no evidence that Voere is making the same gun or that Kleinguenther is still handling them. This probably indicates that the Improved K15 rifle has been discontinued. However, I am going to describe the rifles and actions as if they were not discontinued.

Kleinguenther began importing the Voere-made rifle in 1972, the first one being the K14. This model was dropped in 1975 and a new model, the K15, was introduced. The K15 was replaced in 1982 by the Improved K15 Insta-Fire, the subject of this chapter. The improvement consisted mostly in the elimination of a cumbersome cover for the detachable magazine. This is about the sum total of the background I have about the Kleinguenther rifles and the people who make and sell them. However, I was able to learn a lot about the rifle itself by reading literature on it put out by the Kleinguenther people and by having a rifle to study.

The Rifle

Kleinguenther's Improved K15 rifle is made in a number of standard centerfire calibers and with several styles of stocks. The calibers are 243, 25-06, 257 Weatherby Magnum, 270, 270 Weatherby Magnum, 7X57, 7mm Magnum, 308, 30-06, 300 Magnum, 300 Weatherby Magnum, 308 Norma Magnum and 375 H&H Magnum.

The stock styles are the Standard, as illustrated, the Classic sporter with straight comb and regular forend tip and pistol grip cap with no

white line spacers, the Thumbhole sporter and the Target stock with close pistol grip, high comb and large forend. The standard finish on these stocks is a very smooth high gloss, although a dull oil finish can also be had. The stocks can also be ordered made of various woods of various grades, various checkering patterns and with plain or skip-line checkering. Rosewood forend tips and grip caps are fitted, some with and some without white spacers, and the same goes for the recoil pads. And if you want it you can get ultra-fancy wood, with fancy checkering, carving, and inlays. It's like ordering a custom-made rifle. Detachable sling swivel studs are also standard.

The same barrel and action is used in all of these stock styles. On some of these stocks a steel crossbolt is used through the stock just to the rear of the recoil lug. In all stocks the barrel and action is carefully bedded into the stock with pressure points at both ends of the receiver and at the barrel breech and forend tip. Each rifle is also tested for accuracy on the Kleinguenther range so that accuracy can be guaranteed. Socket-head guard screws are used to hold the stock and the barreled action securely together, with these screws turned up very tight.

Standard barrel lengths for the K15 rifles are 24" for the standard calibers and 26" for the magnum calibers. The barrels are sporter contoured and are on the slender side, with the 24" barrel having a muzzle diameter of approximately .595". Rifling twists, groove and bore dimensions are standard for all calibers. The barrels are extremely well made and finished inside as well as on the outside, and they perform as well as they look.

Among turnbolt actions the Kleinguenther K15 is unique. With seventy-five or more bolt actions shown and described in this book you might ask, how under the sun can still another bolt action be different? Well, the K15 is different in some ways from all the others and it has a few features found in no other turnbolt action. Of course, the K15 can't help but have features used before in other actions, and it also has features that other actions have already tried to copy. Take for example the use of Stellite for the locking shoulder insert; its use not only makes locking and unlocking

the bolt smooth and easy, but it also guarantees the rifle ever developing a head-space problem due to upset of the shoulders or from wear. Altogether it is a unique action, it is clean in outline, very strong and safe. Few other actions have a bolt which can be operated with so little effort and smoothness.

The K15 Improved Action

The main part of the Kleinguenther K15 receiver is a round piece of steel with a smooth hole through its center to accept the bolt. Up front the receiver is bored and threaded to accept the locking shoulder insert and the barrel, with the flat breech end of the barrel jammed tight against the insert to hold it secure. Beginning a short distance to the rear of the insert two openings are machined into the receiver: an ejection and loading opening above and towards the right, and the magazine port below. More machining is done at the bottom to accept the trigger mechanism and on top to thin the receiver bridge and to angle it off at the rear. Four holes are drilled and tapped on top for scope mounts. To provide a flat bottoming surface and a recoil lug to the receiver, an L-shaped piece of steel is welded to the bottom of the receiver ring. This is neatly done. The recoil lug is drilled and tapped to accept the front guard screw. There is ample surface area on both arms of the L to provide solid inletting into and against stock wood. On most K15 stocks the wood in this area is bolstered by a heavy cross bolt through the stock.

The K15 bolt appears to be made of a single piece of steel. The face of the bolt is recessed for the cartridge head and the outer surface machined to leave three equally spaced locking lugs with a diameter the same as the bolt body. Thus no locking lug recesses are needed inside the receiver. A recess

(Above) The Kleinguenther Improved K15 Insta-Fire. Although it wears the Kleinguenther name, this rifle is made in Germany by the Voere firm. However, Voere probably made only the metal parts and the Kleinguenther gunsmiths did the stock work. The rifle pictured is in 308-caliber and weighs 8.25 pounds.

is machined into the top right locking lug to accept the claw extractor, which is held there and tensioned by a spring-backed plunger. This lug is weakened somewhat by being recessed for the extractor but there is still enough metal at both sides and to the rear of it so that it can do its full share of work to hold the bolt locked in the receiver.

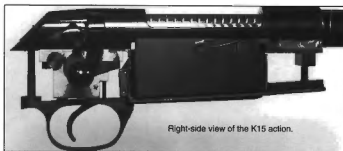
I believe the bolt is an investment casting. While the bolts of most other turnbolt rifles are given a very smooth, level and high polished finish, the K15 bolt has an uneven surface of staggered rows of low bumps the size of jewelers' swirls. They can be felt easier than they can be seen. Each bump is jeweled. Even though the surface is uneven, it is very smooth. One sure result of such a finish is that the jeweling will not wear off and it in no way affects the smooth operation of the bolt.

When the bolt is closed and the bolt handle turned down, the triple set of locking lugs on it engage in front of a matching set of shoulders on the Stellite insert inside the receiver, as mentioned in a previous paragraph. Stellite is an extremely hard space-age metal ideal for just such a purpose. The locking arrangement is a strong one, and except for the difference in the number of locking lugs, the principle is the same as used in the Browning BBR. Browning adopted it after Voere had begun using it.

Although the bolt handle is swept back, its main stem sticks straight out from the bolt; there is no collar or other reinforcement where the root of the bolt handle joins the bolt body. Just the same, the bolt handle serves as the fourth or safety lug by engaging in an L-shaped notch machined in the rear of the receiver. Angled surfaces on both upper corners of this notch provide initial extraction power on the uplift of the bolt handle and seating power on lowering the handle. It requires only a 60-degree lift of the handle to unlock the bolt.

So far there is nothing unusual about the bolt body, handle, locking lugs, extractor or ejector, as the same are found in other modern turnbolt rifles. However, the remainder of the K15 bolt assembly and firing mechanism is different, quite unlike anything I have ever seen. For example, while the striker is cocked by the uplift of the bolt handle, the bolt has no cocking cam notches—instead, these are on a separate part inside the bolt. I will try to explain.

The firing mechanism is composed of a number of parts of which all but one are attached to the bolt sleeve, and that part is the front section of the firing pin, which lies loose inside the bolt head. The bolt sleeve has a lipped tenon which fits inside the bolt, with the two lips engaging in a groove to hold it in place. A raised portion on the outside of the bolt sleeve matches the bolt handle slot in the receiver and closes the slot when the action is closed. This raised portion contains a spring-backed plunger which serves to lock the bolt sleeve from turn-



Right-side view of the K15 action.

ing when the bolt is open. It does this by engaging in a recess in the end of the bolt. When the action is closed, the entire bolt sleeve is within the receiver, with its exposed end flush with the angled rear end of the receiver.

The cocking cam is pinned in place on the striker, and it and the rear end of the striker are fitted into the front of the bolt sleeve. The bolt sleeve tenon is slotted for the cocking cam so that it cannot turn. On the inside of the bolt sleeve and threaded on the striker is the striker head. A lever fitted in a groove in the striker head pivots on a pin, tensioned by a coil spring and adjustable by a set screw, which serves to hold the striker back. The lever contacts the rear in the trigger mechanism. The rear end of the striker shows through a hole in the rear face of the bolt sleeve and serves as a cocking indicator.

Forward of the cocking cam is a short sleeve with twin cocking cam notches on it which I will call the cocking cam sleeve. This part has a small test on its front surface which in turn fits into a matching notch in a shoulder inside the bolt. The purpose of this test and notch is to make the cocking cam sleeve turn with the bolt and to cock the striker. The mainspring is compressed between the cocking cam sleeve and a U-washer in the front end of the striker rod. Thus, on the uplift of the bolt handle the cocking cam sleeve rotates with the bolt to cock the striker, which will be held back by the rear engaging with the striker head. When the striker is released by pulling the trigger, the striker moves forward to strike the loose firing pin in front of it.

Contained in a steel housing, the trigger and safety mechanism is attached to the underside of the receiver with two socket-head screws, one at each end. In the top front of the housing is the rear-bolt-stop. It is held in place in the housing by a pin, tensioned by a spring, and the top part of it projects through a slot into the receiver. The bolt body has a lengthwise groove in this groove serving three functions: 1) to serve as a bolt-stop when the front end of this groove contacts the rear-bolt-stop; 2) as the bolt guide on opening and closing the bolt, to prevent it from turning; and 3) to open a path at the rear so the striker head can become engaged with the rear-bolt-stop when the bolt is closed.

Also mounted on a pin in the housing is the trigger with its upper end contacting the rear-bolt-stop, so that when the action is cocked the trigger holds the rear-bolt-stop in engagement with the striker head and to release it when the trigger is pulled. The trigger is also linked to the rear-bolt-stop so that on pulling the trigger back far enough the rear-bolt-stop will be tipped down to allow the bolt to be withdrawn from the receiver. The trigger is provided with a spring and a socket-head setscrew directly in front of it to provide weight of pull adjustment in a range from about 2 to 7 pounds. Behind the trigger is another setscrew with lock nut set at the factory and this screw must not be tampered with.

Also built in and on the trigger housing is the safety. It is made with a large serrated thumb-piece for sure manipulation. Pivoting the safety



Left-side view of the action.

PART II: Commercial Rifles & Actions



Right-side view of the action showing the bolt open and the detachable box magazine detached.

back rotates a rotary bolt to lock the trigger and, at the same time, move a lever to lock the bolt. Everything about the trigger and safety mechanism is well built and there is little likelihood the function of the sear will be affected because the bolt-stop is combined with it.

The magazine assembly is comprised of two main parts, the detachable magazine box and the magazine box holder. The magazine box holder is a sheet metal shell attached to the receiver by two small lips at its front which slip into notches in the recoil lug, and at the rear by another lip which extends under the front of the trigger housing. At the rear of this holder is mounted the magazine box release consisting of two levers, two pins and a spring. The top lever projects into the holder and engages in a notch in the rear of the magazine box when it is inserted. The lower lever projects into a slot in the front of the trigger guard bow so that it can be easily depressed to release the magazine box. In front of the magazine holder is a small spring clip which holds the front of the magazine box in place. Two wire spring clips, one on each side of the holder with their ends projecting inside the holder, serve to eject the magazine box from the rifle.

The magazine box of staggered-column width is well constructed of sheet steel, stamped, bent and spot welded into a box to hold five standard cartridges or three belted magnum cartridges. It has a regular staggered-column follower and flat follower spring, as well as guide lips on its open end to hold cartridges inside and allow them to be fed out. Rounded ridges are stamped into the sides of the magazine at the shoulder junction of the cartridge it is made for; they hold the cartridge to the rear when the rifle recoils from firing, and this helps prevent bullet nose damage. A filler block in the rear of the box is used to shorten it for cartridges of the 308 class.

In place in the rifle, the magazine bottom is flush with the stock. Cartridges can be fed into it

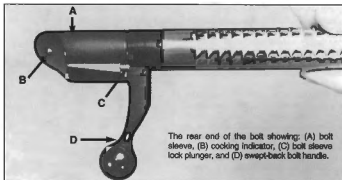
whether it is in the rifle or out of it. There are also cartridge guide lips in the magazine well opening in the receiver. If the owner of a K15 wants to do so, he need never remove the magazine from the rifle. He can load and unload the magazine while it is in place and, in so doing, avoid the possibility of losing or misplacing the magazine. This last is an ever-present problem with detachable-magazine rifles.

The trigger guard is made of steel—the bow part appears to be an investment casting, with the other three parts that surround the magazine holder welded together. Socket-head screws through holes in the ends of the guard thread into the recoil lug and rear end of receiver. They securely hold the action and barrel assembly in the stock. A steel sleeve pressed into the hole for the rear guard screw regulates the space between the trigger guard and the receiver. It prevents the screw from being turned too tight and perhaps damaging the stock or affecting the bedding. There is no sleeve for the front guard screw, but there are two pillars of epoxy or some other material through the wood between the front of the trigger guard and receiver to maintain this spacing.

Takedowns and Assembly

First open the bolt and remove the magazine to make certain the rifle is unloaded. To remove the magazine, depress the magazine release latch located at the front of the trigger guard bow. To remove the bolt after it has been opened, pull the trigger back until the bolt can be pulled free of the receiver.

Disassemble the bolt as follows: With your thumbnail or a dull tool, depress the bolt sleeve lock plunger in the front edge of the bolt sleeve and turn the bolt sleeve clockwise a few degrees until it pops out. It can then be removed. When it is removed, the front section of the firing pin will drop out. The cocking cam sleeve might also drop out, but if it does not, tap the rear end of the bolt against the bench top and the cocking cam sleeve will drop out. To reassemble, first drop in the front section of the firing pin, making certain that it falls in place with the tip protruding from the breech face, then insert the firing mechanism with the lock plunger in line with the lower edge of the bolt handle root, and then push the bolt sleeve



The rear end of the bolt showing: (A) bolt sleeve, (B) cocking indicator, (C) bolt sleeve lock plunger, and (D) swept-back bolt handle.



The K15 bolt head showing: (A) locking lugs, (B) extractor, (C) ejector, and (D) bolt-stop groove.

against the bolt and turn counterclockwise until the plunger slips into the lock position. Next, insert the cocking cam sleeve with test forward in line with the hole in the bolt body. Do not attempt further disassembly of the firing mechanism as this is a job for a competent gunsmith.

To remove the barrel and action from the stock use a correct size metric Allen wrench and remove the two guard screws, the rear one first and then the front one. The trigger guard can then be removed and the barrel and action lifted out of the stock. The trigger mechanism can then be removed by turning out the socket-head screw. This will allow the magazine box holder to be removed. Do not attempt to disassemble the trigger and safety mechanism, as this is also a job for a competent gunsmith. Reassemble in reverse order.

Markings

The Kleinguenther Improved K15 rifle is marked as follows. Stamped on left side of receiver:

Kleinguenther, Seguin/Tex.

The serial number is stamped on the right side of the receiver ring. The model and caliber designations are stamped in one line on the left side of the barrel as:

MOD K15 CAL. .308 WIN

Stamped on the right side of the barrel is:
VOERE VOEHRENBACH MADE IN GERMANY

Comments

I have had the chance to closely examine only two Kleinguenther K15 rifles and my comments are based on those. The rifles were extremely well finished on the outside. Major metal parts such as the barrel, receiver, trigger guard and bottom of magazine are given a mirror polish and then blued. The markings on the barrel are evidently put on after the barrel was polished as the edge of the letters are raised.

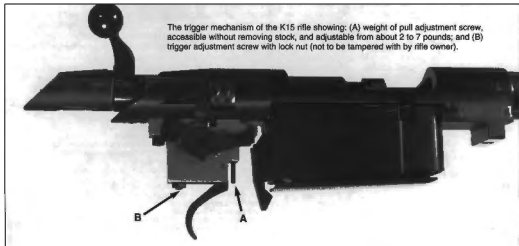
The stock is also expertly finished. The surface is sanded level and smooth. There are no waves or rounded edges. The recoil pad, grip

cap and the forend tip are fitted without gaps and level with the wood. Both stocks that I saw had a high gloss finish applied evenly, with all the grain filled and with no runs; then the stock was checkered by a skillful hand. Both rifles were showpieces. The jeweled bolt has a bright polished finish and it shows up well with the polished blue finish of the receiver.

All the parts of the action are steel except the trigger housing, which is a lightweight alloy. The follower appears to be stainless steel and it is left bright. All the screws are of the socket-head type with metric threads and you need metric Allen wrenches to turn them. Some of the parts appear to be investment castings, such as the bolt, bolt sleeve and trigger guard bow. Incidentally, on one of the rifles I examined, the inside of the trigger guard was not polished, but this could have been an oversight. The magazine holder and the magazine box are mostly of sheet metal construction.

As mentioned earlier in this chapter, the recoil lug is welded to the receiver. There is absolutely nothing wrong with this, but I did wonder why the receiver proper and the recoil lug were not made as one piece. There is also some welding done on the trigger guard in its manufacture, but it is so skillfully done that evidence of it does not show on the outside. Metal surfaces that do not show are not polished, except the moving and working parts. Of course, working parts that require hardening are hardened.

The inside of the receiver is smooth and polished, and the bolt moves back and forth in it effortlessly. There are no raceways of any kind inside the receiver, not even one for the striker head. The cocking of the striker is done entirely inside the bolt. Everything about the operation of the action is smooth and easy, including



The trigger mechanism of the K15 rifle showing: (A) weight of pull adjustment screw, accessible without removing stock, and adjustable from about 2 to 7 pounds; and (B) trigger adjustment screw with lock nut (not to be tampered with by rifle owner).

PART II: Commercial Rifles & Actions



Left side view of the Kleinguenther K15 rifle.



A deluxe custom Kleinguenther K15 Insta-Fire with ultra fancy wood, checkering, inlays and engraving. Shown with Leupold variable-power scope in Buehler mounts.

the uplift and lowering of the bolt handle, safety operation, trigger pull, bolt release pull and the removal and replacement of the magazine.

Ever since Kleinguenther began importing and selling their Voere-made rifles they have always insisted that their rifles not only look good and operate smoothly, they also demanded that they be accurate and stay accurate. The highest priority is given to accuracy—that has been their main selling point. Their accuracy standards are high, and they have to be if they guarantee that each one of the rifles they sell will deliver a specific degree of accuracy. And Kleinguenther does just that. Their guarantee of accuracy is three shots within 1/2" center to center at 100 yards with a selected load.

Fine barrels are required to begin with, plus a good ignition system. Voere barrels are quality, and the Insta-Fire ignition system is hard to beat. In addition to the barrel and ignition system, Kleinguenther has worked out a bedding system that works. It works not only to produce tightly grouped shots, but maintains consistent accuracy even as the barrel

warms up, and it maintains zero over a period of time. All of this is very important to the hunter; he likes to know that his next shot will strike where he wants it to. Kleinguenther tests each rifle and furnishes to the purchaser proof of accuracy with an accompanying target and the load they used.

Their bedding method utilizes three points: at the rear of the receiver, at the recoil lug area of the receiver and barrel, and at a point in the forend about where the front sling swivel stud is located. A bedding compound is used at each of these points. In addition, the wood in the recoil lug shoulder area is supported by two vertical pillars so that the front guard screw can be turned up very tight and stay tight. Anyway, once properly sighted in, the rifle is likely to stay sighted in.

The Kleinguenther K15 is a man-sized rifle. The 308 caliber K15 I had weighed 8.25 pounds without scope and mount. Put a scope and mount on it and load the magazine, and it

will weigh close to 10 pounds. In a magnum caliber with a 2" longer barrel and a sling, close to another pound will be added to it. That is a lot of rifle to carry. That will not bother a large man, but a smaller man might choose a lighter and smaller proportioned one. While the butt-stock up to the rear of the pistol grip is trimmed to a bare minimum, as is also the forend, the pistol grip and the middle section of the K15 stock is proportioned for a large-handed man. The pistol grip has a flared grip cap and a palm swell, features many rifle shooters like. I am 6 feet, 4 inches tall, hands of average size, and with the trigger placed as it is, the K15 pistol grip is too large, too long and too far back for me. The middle section of the stock is deep and boxy with a girth that fits a large hand the best. This large girth goes along with all turn-bolt rifles that have a large capacity staggered-column detachable magazine, and if you like these features you will have to put up with a bulky middle section.

Dimensional Action Specifications

Receiver length	9.250"
Receiver diameter	1.332"
Bolt diameter	.845"
Bolt travel	(for 308) 4.125"
	(longer for longer cartridges.)
Striker travel	.156"

General Specifications

Type	Bolt action repeater, operated by bolt handle.
Receiver	Machined steel, solid bridge, recoil lug welded to receiver ring.
Bolt	One-piece construction, three front locking lugs of bolt body diameter, root of bolt handle serves as safety lug.
Ignition	Two-piece firing pin powered by coil spring, twin cocking cams, cocks on uplift of bolt handle.
Magazine	Detachable, staggered-column box magazine.
Trigger	Single stage adjustable for weight of pull.
Safety	Pivotal, locks trigger and bolt.
Extractor	Claw type fitted in bolt head.
Ejector	Spring-backed plunger in bolt face recess.
Bolt-stop	Sear serves as bolt-stop, released by pulling trigger.



Krico Model 300 Hornet

IF MY MEMORY serves me right, I believe that I ran across the Krico name many years ago, perhaps in an early Stoeger's catalog. And, as I recall, the rifle that bore that name was a 22 rimfire turnbolt repeater with a magazine that seemed to merge with the front of the trigger guard. Also, it had a typical German-styled sporting stock with schnabel and cheekpiece. (I may be mistaken here, for this rifle could have been a Brno.) I could not afford such a rifle then, but many years later when I heard that Krico had brought out a rifle chambered for the Hornet I ordered one. This was in 1994. When it arrived, and on opening the box, I was somewhat surprised to see that it was nothing like the Krico in my memory. But it is a Krico, and I have no doubt but that it will serve its next owner well.

The Krico M300 rifle I received and which is the topic of this chapter is the Standard model—the lowest priced of the three Hornet rifles the firm makes. My rifle is marked as follows:

In script on the barrel, ahead of the rear sight, is the name and address of the importer as follows:

Mandsale—Scottsdale, AZ

Stamped behind the rear sight is the caliber. On the left side of the breech is the serial number, with the last three digits also on the shroud. Stamped on the left side of the receiver:

A. Kriegerkorte GmbH Furth Germany

German proofmarks are stamped on the breech end of the barrel and receiver.

The 1994 literature sent me by the importer shows and describes three different models of the M300 models in 22 Hornet. They are the Standard model which has a 23.5" barrel,

grooved and drilled and tapped for scope mount, a checkered plain European walnut stock and open sights. The second model is the Deluxe, which is the same as the Standard except the stock is of much fancier walnut. The third model is the Stutzen which has a full-length Mauser-style stock and a 19.5" barrel. Each model is higher priced than the other, but all have the same action and it is the action in which we are most interested.

The Krico M300 is a bolt-action repeater with a detachable single-column box magazine, for use primarily for hunting the smaller varmints. All M300 models are adult-sized rifles and I do not class any of them as real lightweights. If fitted with a good scope, any of the three would be quite ideal for the serious varmint shooter for taking crows, prairie dogs and the like at short to medium ranges.

On noting the name of the manufacturer on my rifle, it reminded me that I had written about another rifle made by that firm. I became curious and checked back on the previous chapters and came across the Tradewinds Model 600. There I noted that the same name is on both rifles but with different addresses. Although the rifle in Tradewinds is a Krico, I called that chapter the "Tradewinds M600" simply because the name Tradewinds was stamped on the receiver.

The M300 Action

The receiver is a steel tube machined on the outside to a diameter of 1.062" and bored and reamed inside to accept the .665" diameter bolt. It is machined up front to accept the barrel shank, at the bottom to leave a magazine well opening and the double-set trigger, and on the right side for the ejection port. The top of the receiver is grooved for tip-off scope mounts as well as being drilled and tapped for

screw-on mount bases. It has no tang. From end to end it is 7.50" long. The receiver ring is 1.110" in length, the loading port 1.780" and the rest what is normally called the bridge a lengthy 4.610".

The barrel is sporter contoured, 23.5" in length and has a muzzle diameter of .590". For the Hornet the bore has a rifling twist of 1:14" with six grooves with left-hand twist. It is fastened to the receiver the same as Anschütz barrels are fitted; tight but not threaded—a tight slip fit into the receiver with a single cross pin. I imagine that like the Anschütz, the barrel was, perhaps, even a shrink fit with the receiver heated.

The bolt is of two-piece construction with a non-rotating body and rotating bolt handle sleeve at the rear. This sleeve fits over a turned-down and partly threaded section of the bolt body. At the front of this 1" sleeve is the bolt handle and it's near the two rear opposing locking lugs. To accept this part, the rear of the receiver is machined with raceways and locking shoulders for the locking lugs, and a single deep notch through the wall for the bolt handle with its root serving as a safety lug. The rear of this notch is angled to force the bolt forward as the handle is turned down. It has a similar camming surface at the top corner of this notch to force the bolt rearward on raising the handle, as in most bolt-action rifles.

A simple spring-backed claw extractor positioned in a groove at the front of the bolt body provides all that is necessary to extract loaded or fired cases. The breech end of the barrel is flat and this is broken only by a nar-

(Above) The Krico M300, caliber 22 Hornet.



The Krico M300 action. Arrows point to the cocking indicator and to the groove in the barrel which fits over a steel recoil lug wedged in the stock.

row slot into which the tip of the extractor fits when the bolt is fully closed. The face of the bolt is recessed, with the rim extending only over the upper half. The bolt body below the front part is machined flat so that the bolt rides low over the magazine. A narrow raised portion at the front of this flat contacts the cartridge rim to push it out of the magazine and into the chamber.

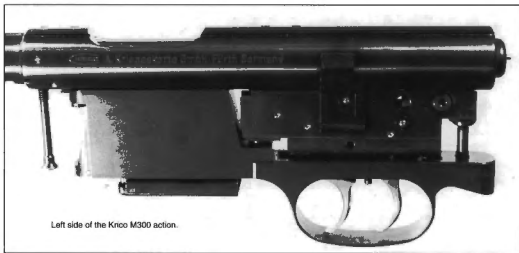
At the left side of this flat surface is a lengthwise groove for the ejector. At the rear of the magazine opening in the receiver, a flat-topped, half-moon, small steel part is held in place at the bottom of the bolt raceway by a

screw. This screw is deep inside the front stud into which the forward trigger guard screw threads. A raised ridge on the upper surface of this part matches the lengthwise groove in the bottom flat of the bolt, and this becomes the ejector. This is a vital part because it does more than eject cases. It also prevents the bolt body from rotating, a part not unlike the similar parts in the Winchester Model 43 described elsewhere in this book. For this reason it is also called the bolt guide.

The working parts in the bolt of the M300 are few, but more complicated than I would have guessed until I disassembled the bolt.

Then I discovered that here was a firing mechanism arrangement which I had never seen before. It reminded me of the bolt of the Kleinguenther rifle described elsewhere, because it had a firing mechanism vastly different from others.

The best way to describe the Krico firing parts is to take the bolt apart. At the rear of the bolt is the shroud, which is threaded to the bolt body, right-hand threads. Ahead of the shroud there is a very thin lock washer and it takes some effort to unscrew the shroud. I did it by winding several layers of masking tape around it and using pliers. When turned off, I



Left side of the Krico M300 action.



Left-side view of the Krico M300 action with bolt open showing: (A) bolt shroud, (B) locking lugs, (C) showing one of two tip-off scope mounting grooves and (D) tapped holes for non-tip-off mount bases.

found the mainspring and the cocking indicator inside. The cocking indicator also served partly as the mainspring guide and plunger. Next I removed the thin lock washer and the bolt handle sleeve. Under the sleeve was the cocking cam. This was a small part, curved part way around the turned down section of the bolt. Lastly, I removed the flat firing pin. A simple mechanism? Not really. Whoever came up with this system must have worked hard at it. Most of it is easy to understand, such as the flat firing pin, the mainspring behind it, the shroud and cocking indicator, but how the firing pin is cocked is not so simple. Here is how that works: The cocking cam, a small frail part, or so it seemed to me, lies in a groove in the bolt body; when the bolt sleeve handle is in place this little part is entirely hidden. This important piece is curved to fit the bolt and thin enough to allow the bolt handle sleeve to drop over it. At one end it is bent up sharply, with the front of the bolt handle sleeve slotted to slip over it so that this piece rotates with the sleeve. At the other end, this piece is angled off to become the actual cocking cam surface to engage the firing pin, so that on raising the bolt handle the firing pin is drawn back to cock it. At the upper end of this cam surface there is a shallow notch, just as in most turnbolt bolts. When the firing pin is cocked, the sear in the trigger mechanism rises in front of a projection on the firing pin, and on lowering the bolt handle the firing pin is held cocked. I would guess that the very first part of this action to break or wear out would be this small cocking cam.

The bolt-stop is like none other I have ever come across. It is located on the left of

the receiver, as are most others, and is made of a single small piece of spring steel. It's held in place by the end of the pin on which the trigger sear is mounted. It snaps in place and is not held on by a screw. Integral with the inside surface, a stud projects through a hole in the receiver wall and this is the stop. This stud projects into a groove in the side of the bolt body, the front end becoming the stopping point. A serrated surface on the bolt-stop projects above the stock line, and the bolt is released by pushing its upper end to the left.

Three different trigger mechanisms are made for the Krico M300 action: plain single-stage, double-set and a match trigger. I have not had the opportunity to examine the first and the last types so I will not comment on them. My rifle was fitted with the double-set triggers and as such triggers go this one is a dandy. It is well made and finished and performs flawlessly. My only criticism is that the triggers should be closer to the rear of the guard bow or, better yet, that the pistol grip be made closer to the bow.

This trigger mechanism is housed in a steel shell or box which is attached to the bottom rear of the receiver by a pair of threaded studs at each end. These studs are threaded at the lower end, and hold the housing via nuts. In addition, both studs are hollow and threaded inside to accept the two screws that hold the trigger guard in place.

Two pins through the lower part of the trigger housing hold the triggers of this mechanism. The rear trigger is the cocking trigger and the front one the firing trigger. The rear trigger is powered by a rather stiff spring, while the front one has a very weak one. To

"set" the front trigger, the rear trigger is pulled back until it is cocked. Touching the front trigger releases the cocked trigger to strike the sear (or rocker as it is often called) which then releases the firing pin. The rifle can also be fired by merely pulling the front trigger. On this rifle there is considerable slack to take up on the front trigger, but the pull then is rather short and light, which is something unusual with most double-set triggers.

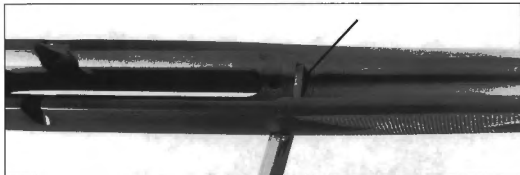
The small screw between the triggers is to adjust the lightness of the pull of the front trigger when the double-set mechanism is used. There is a whole lot more to know and learn on the safe and proper use of a set-trigger, as I have outline in my small book, *Managing And Mastering A Set-triggered Rifle*.

I followed my own advice and I did not completely disassemble the set-trigger mechanism on my Krico rifle. However, having disassembled many others in the past, I know fairly well just what this trigger mechanism is comprised of, other than what is visible from the outside. Besides the two triggers and the adjusting screw, there are several pins, springs, the sear and perhaps another lever in the Krico trigger housing.

If you must adjust the set-trigger, the barreled action must be removed from the stock. This is necessary to gain access to a small black set-screw in the lower left side of the trigger housing, which must be loosened before the adjustment screw can be turned.

The safety, with its serrated upper portion, is mounted on the rear right side of the trigger housing, and rather than sliding, it pivots to the Safe and Fire positions. Pivoted to the rear, it locks both the sear and bolt.

PART II: Commercial Rifles & Actions



Arrow points to the steel recoil tug in the wood of the Krico M300 rifle forend.

The magazine holder is attached to the receiver with two screws. It appears to be a casting but it is well made and substantial. Into the lower front of it there is a serrated and pivoting catch to hold the magazine in place. It is all good. There is also a small L-shaped piece of metal that fits between this magazine holder and the receiver, which serves to fill the gap between the magazine and the chamber.

The single-column box magazine is well constructed of sheet steel. Inside is a zig-zag follower spring and a flat-topped follower. Both sides of the magazine body have pressed-

in guides; the ones at the rear to guide the rim of the cartridge, and the deeper forward ones to center and guide the cartridge into the chamber. The bottom of the magazine has an easily removable base plate which projects below the stock line for easy and convenient grasping.

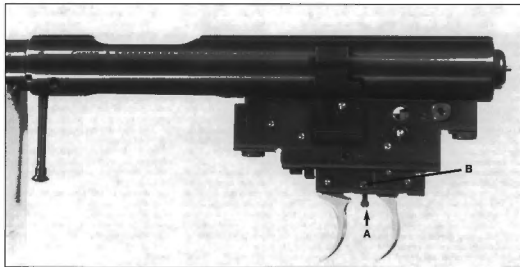
The stock and the barreled action are held together by two screws which thread into the studs holding the trigger housing in place, and by one escutcheon screw through the stock and threading into the front end of the receiver. This escutcheon is combined with a steel bushing which extends from the bottom of the stock to the receiver. Removing the two

screws at the ends of the trigger guard allows the trigger guard to be removed. Removing the front guard screw allows the stock to be separated from the barreled action.

There is enough information in the preceding chapters to instruct you on how to disassemble the bolt and how to remove the stock.

The Stock

The stock on my Standard M300 Krico rifle is made of plain but good European walnut. It is entirely styled for the American shooter—there is nothing European or Germanic about it except the narrow, non-



The Krico M300 action minus the trigger guard and magazine showing the following: (A) set-trigger adjustment screw and (B) set-trigger adjustment screw lock screw.

detachable sling swivels attached to the stock with wood screws. It is fitted with a hard plastic butplate but no pistol grip cap. There is a MonteCarlo comb but no cheek-piece. The forend is semi-flat bottomed and its end is cut off at an angle. Course checkering covers much of the pistol grip and less of the forend.

Machined inletting is rough leaving a lot of tool marks and splinters. The barrel channel is deep enough so the barrel is free-floating. On my rifle, the wood on the left side of the tip bears more heavily against the barrel than the other side. What is novel in this stock is that a steel block is snugly inletted and wedged into the rear of the forend channel. The bottom of the barrel, just ahead of the receiver, has a groove across it to engage the steel lug in the stock. This serves as the recoil lug! The channel forward of this lug is free of the barrel.

Comments

There are a few features of the M300 I think could have been better. While the bolt-stop is of one piece and seemingly simple, I do not like it. The corners of its serrated top

are too sharp—they ought to have been rounded off. On my rifle, the rear end of the receiver is smooth and polished but not so the ejection port. Here there are tool marks, sharp edges that could cut the finger on single loading, and there are machine burrs at each end and little sharp points at the end of the scope mounting grooves. I intend to smooth them off and do some retouching with a cold blue.

I certainly do not like the way the barrel is fitted to the receiver. I would greatly prefer it be threaded into place as with most centerfire rifles.

Another feature which I believe could be greatly improved is the cocking cam. Something similar to this arrangement was used in the Tradewinds M600 action. In this action, the cocking cam has two camming surfaces and a pin to cock the firing pin. With forethought I believe this could have been done on the M300. If the cocking cam on the M300 was made that way it would have doubled the camming surface and there would be far less wear, and less chance of the cam breaking or getting lost. Also, with

more camming surface area against a heavy pin, the action would cock easier and more smoothly.

If I had designed and made the M300 Standard stock, the pistol grip would be closer to the triggers and it would be shorter and somewhat slimmer. That would have made using the set-trigger handier to manipulate and use. The pistol grip on the Ruger M77/22 Hornet is what I have in mind.

Putting the steel recoil lug in the stock and notching the barrel is a novel idea. However, I dislike the notching of the barrel and I would have done it differently, as I have actually done in the past. My method was to drill a hole in the barrel about $\frac{3}{16}$ " deep and of that diameter, and then glass-bed a rod about $\frac{7}{16}$ " long into the stock in line with the hole in the barrel.

The Krico action is different but I have my doubts about some of the differences. I would overlook them if this Hornet rifle proved exceptionally accurate, which it very well might be. But until it is tested I will stick with the Kimber M82, which is the finest and most accurate 22 Hornet rifle I have ever owned.

Dimensional Action Specifications

Action weight	36 oz.
Action length	7.75"
Receiver diameter	1.065"
Bolt diameter	.685"
Bolt travel	2.145"
Firing pin travel	.225"

General Specifications

Type	Bolt action repeater.
Receiver	One-piece tubular construction. No integral recoil lug.
Recoil lug	Steel block in stock fits groove cut into barrel breech.
Bolt	Two-piece construction: non-rotating bolt body; rotating bolt handle sleeve with dual opposed locking lugs; root of bolt handle serves as safety lug.
Ignition	One-piece flat firing pin, coil mainspring, separate cocking cam cocks on uplift of the bolt handle.
Magazine	Detachable, single-column.
Trigger	Adjustable double-set trigger.
Safety	Pivoting type locks bolt and sear.
Extractor	Spring-backed claw extractor.
Ejector	Combined with bolt guide.
Bolt-stop	One-piece construction on left of receiver pivoted outward to release bolt.
Takedown	None provided.

Mathieu Left-Hand Rifle



AS A RIGHT-HANDED shooter, I never was much interested in left-handed bolt-action rifles until the time came when I was forced to change sides; that is, to begin shooting from the left shoulder because of failing sight in my right eye. I then began to understand the problems southpaw shooters faced, and for the first time, I realized that there was truly a need for left-hand bolt-action rifles. Mossberg had come out with a line of 22 rim-fire bolt-action rifles during the late 1930s, but it appears now that there was not too much demand for them; they were soon discontinued. Perhaps the first specialty gun-maker to turn out a high-powered turnbolt rifle was R.F. Sedgley of Philadelphia. He is supposed to have made up a few left-hand rifles on the 1903 Springfield, although I have never seen one or ever talked to anyone who has seen one. In the August, 1940, issue of *American Rifleman*, a mention is made that Stoeger could also furnish a left-hand Mauser action, but I fail to find any verification of this in any of my Stoeger catalogs, which date back to the mid-1930s.

In the August, 1949, issue of *American Rifleman*, there is a photo of a left-hand M98 Mauser conversion done by Roy Grable. This was accomplished by fitting a geared bolt handle on the front left side of the bolt sleeve, pivoting it on the bolt sleeve lock, and meshing it with gears cut into the rear of the bolt body. It probably worked, but to me it looks like a kluge arrangement. Another gunsmith, still in business at this writing, began specializing in converting 721 and 722 Remington actions for left-hand operation. He is Dale M. Guise of Gardners, Pennsylvania.

All of these, as well as some others, were conversions of existing right-hand actions; they were not honest-to-gosh left-hand actions. This situation was changed when Mathieu Arms Co. of Oakland, California, introduced a quality "true" left-hand turnbolt action around 1950. It was a custom-made action, expensive, and delivery on it was

slow, but it was a true lefty action, and a good one.

It was seldom advertised and little has been written about it or its maker. I cannot find it mentioned even once in any of my many gun books, and only once in *American Rifleman*, and that was the September, 1952, issue. But word got around that it was a good action. It probably received the most publicity from Weatherby, who used it for building those fine Weatherby Magnum rifles for their left-handed customers before the Mark V Weatherby action was introduced in 1958.

Mathieu actions, barreled actions and complete rifles stocked by Fajen were listed in the 1961 Reinhart Fajen, Inc., catalog. The standard action for 30-06 length cartridges listed at \$162.50, the magnum at \$175. Barreled actions were \$211.45, while the Fajen-stocked rifle was \$277.50. Those were the good old days.

This is all the information that I have been able to dig up on the Mathieu action. A letter of inquiry to the Mathieu Arms Company was not answered prior to completing this book, so I don't know about their present status. However, when word got out that I was doing a book on centerfire turnbolt actions, I was loaned a magnum Mathieu action by my good friend Dean Miller. Here follows a description of it.

The Mathieu Action

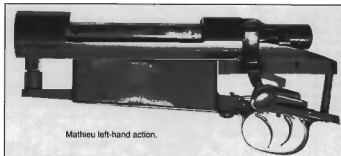
The Mathieu receiver was machined from a solid piece of steel. While not a copy of any other receiver, it does have features of some other actions, which indicate that Mathieu was thoroughly familiar with various turnbolt actions. For example, the barrel shank threads are the same as those in the 1917 Enfield action; the bridge is shaped like that of the 721 Remington; the bolt-stop housing resembles the cut-off housing on the 1903 Springfield; and the overall general lines of the receiver, including its recoil lug, flat bottom and tang, are not unlike the 70 Winchester

receiver. The 1.5" long receiver ring is round on top, flat on the bottom, with the recoil lug an integral part of this ring. The loading port is about 3.640" long, its right (unnotched) wall enclosing the right locking-lug raceway. The left wall is cut down to the bottom of the left locking-lug raceway. The bridge, about 1.625" long with a flattened, but slightly rounded top, is about 1/16" lower than the ring. The receiver ends with a well-rounded tang.

Rearward from the recoil lug to the rear of the bridge, the bottom of the receiver is flat. The magazine opening is milled out of this flat surface, leaving cartridge guide lips on each side. The extra metal left on the receiver to form the flat bottom provides the needed metal below the receiver walls to give strength and rigidity to the middle of the action. Extra metal is left under the tang to provide walls for the trigger and sear parts.

An extra lump of metal, left on the right side of the bridge to hold the bolt-stop, is machined to form a very graceful housing for the very simple bolt-stop. I say "simple" because it is merely a thick, notched washer. A slot is cut through the housing into the locking-lug raceway, the bolt-stop positioned in it on a pin lengthwise through the housing. A small set-screw holds this pin in place. A small spring and plunger, positioned in the rear of the housing, contact a groove in the bolt-stop. The outside edge of the bolt-stop is knurled so that it can be rotated with the thumb, and rotating it so its notch is aligned with the lug raceway allows the bolt to be removed. Otherwise, the bolt is stopped when the right locking lug contacts the unnotched part of the bolt-stop. Although not easily made, the Mathieu bolt-stop system is simple, strong and unobtrusive.

The Mathieu bolt body appears to be machined from a solid bar of steel, with the bolt handle base an integral part of the bolt; however, the low-profile bolt handle is welded onto this base. The handle base, by fitting into a deep notch cut into the tang, serves as a



Mathieu left-hand action.

safety locking lug. The top part of the bolt handle base has an inclined surface which, contacting a similar cam on the rear of the bridge, provides the initial extractor camming power when the bolt handle is raised.

The dual-opposed locking lugs are on the extreme forward end of the bolt. Neither lug is slotted or drilled, hence not weakened thereby. When the bolt handle is turned down, these lugs engage behind ample-sized locking shoulders within the receiver ring to hold the bolt against the flat-faced barrel. Approaches to the locking-lug shoulders are well-rounded off and, to a lesser extent, so are the locking lugs, thus on lowering the bolt handle the bolt is forced forward about .20". More on this later.

The bolt face is deeply recessed for the cartridge head. The barrel is normally fitted so that, when the bolt is closed, the front of the bolt comes within .004" of the barrel, thus the cartridge is entirely sealed in the chamber and bolt face recess.

The plunger-type ejector, spring loaded, fits into a hole in the bolt head and is held there by a cross-pin. The simple hook-type extractor fits into a groove in the front side of the bolt head; it is held in place, and tensioned by, a spring and plunger set into a hole behind it. The modern Husqvarna Model 8000 action has copied the Mathieu locking, breeching, ejector and extractor systems. Mathieu proba-

bly was not the first to use these individual systems, but he probably was one of the first to bring them all together. His system is widely copied today.

There are no gas-vent holes in the receiver ring, but there is a hole in the bolt about an inch back from the bolt face. With the bolt closed, this hole appears near the front-bottom corner of the loading port. Thus no gases are directed into the right locking-lug raceway, but directly into the open.

Mathieu designed and put together a very interesting firing mechanism, the bolt drilled from the rear to accept it. The square-type threads of the bolt sleeve screw into the rear of the bolt. The cocking piece slides in a recess and slot in the rear part of the bolt sleeve. The rear end of the one-piece firing pin extends into the bolt sleeve and cocking piece, with the coil mainspring compressed over the firing pin and between the bolt sleeve and a shoulder on the front of the firing pin. A groove is cut around the rear end of the firing pin, over which a split collar is fitted, with the collar in turn recessed into the rear end of the cocking piece. Thus, the cocking piece is not solidly attached to the firing pin, and the firing pin is free to turn. Forward travel of the firing pin is halted when a shoulder on the front of the pin contacts a shoulder inside the bolt, thus maintaining constant firing-pin protrusion.

A cam notch is cut into the rear of the bolt; on the 90-degree up-turn of the bolt handle, the cam on the cocking piece, which extends into this notch, forces the cocking piece and firing pin (together called the striker) back about .20". Then, after opening and closing the bolt (at which time the cocking cam is placed behind the sear), on lowering the bolt again the striker is cocked another .190" by the action of the bolt being pulled forward as the locking lugs engage the locking shoulders in the receiver. Thus, the total striker fall (travel) is about .390". Although the mainspring is very strong and the striker travel short, it takes little effort to raise or lower the bolt handle, at which time cocking occurs.

The left side of the bolt sleeve flares outward to match the top part of the bolt handle (remember, this is a left-hand action), and into this the safety is built. The winged safety-lever pivots on a pin held in the bolt sleeve by an Allen head set-screw. A spring and plunger, positioned in another hole in the bolt sleeve, provide ON and OFF tension to the safety, with the plunger also functioning as the bolt lock; when pushed forward, it goes into a hole in the rear of the bolt when the safety is tipped up. Also, when tipped up, a cam on the base of the safety is cammed in front of the cocking piece to force it back slightly and hold it back. The safety is low enough to clear the lowest mounted scope, and its lever is long enough so it is easy and convenient to operate.

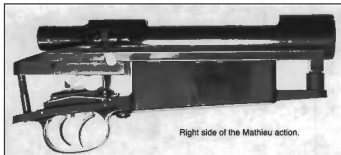
The rear part of the bolt sleeve is nicely rounded, with its end threaded, over which is screwed a cap. Thus, the bolt sleeve is entirely closed except at the bottom, and no powder gases can escape to the rear. A small set-screw is threaded into the joint between the bolt sleeve and its cap, which prevents the cap from turning.

There is no separate bolt-sleeve lock, as on the 1903 Springfield, but with the nose of the cocking piece resting in a shallow notch in the rear of the bolt, when the bolt is open, the bolt sleeve is not easily turned.

So far this action is all, or mostly all, "Mathieu." The rest is more or less "Springfield," which includes the trigger guard/magazine and provisions for a trigger.

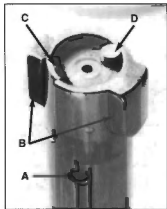
The bottom rear of the receiver is machined except the regular 1903 Springfield sear and trigger, so any commercial trigger made for the '03 will also fit the Mathieu action. I understand that Mathieu regularly used the Jaeger single-stage trigger in his actions, as the one illustrated here was originally fitted with Jaeger's trigger. This action now has a double-set trigger of modern German (Anschutz) manufacture.

I think the Springfield trigger guard/magazine unit cannot be beaten for functional reliability or for looks. Probably Mathieu



Right side of the Mathieu action.

PART II: Commercial Rifles & Actions



Mathieu bolt head showing: (A) gas-vent hole, (B) dual-opposed locking lugs, (C) extractor and (D) ejector.

thought the same. At any rate, these units have been readily available in the past. For this reason, as well as the fact that making such a guard/magazine assembly would be about as difficult as making a receiver, Mathieu decided to use this unit. The Mathieu action shown here was made for the long H&H belted Weatherby Magnum cartridge, with a receiver-well opening of 3.750" in length; the Springfield magazine box was lengthened accordingly by sawing the box in two and welding in short wall sections, as required, to make it fit. Mathieu then made a new floorplate, follower and follower spring to fit. He probably retained the original Springfield floorplate latch, but on the action shown, the latch had to be discarded when the set-trigger mechanism was installed. The plate is now held in place by a round-head screw.

Since Mathieu left-hand actions were more or less custom made, they most certainly are not all alike. It would seem highly probable that if he made an action for the 270 or 30-06 that he'd use an unaltered Springfield magazine and a shorter action. No doubt some design changes were made from the first to his last action. The action shown here is serial numbered 1303 (stamped on the bridge), and I believe it is fairly representative of most of the actions he made.

Takedown and Assembly

Make sure the rifle is unloaded. To remove the bolt, tip the safety-lever down, rotate the knurled bolt-stop clockwise, then raise the bolt handle and pull the bolt from the receiver.

To remove and dismount the firing mechanism, unscrew (turn counterclockwise) the bolt sleeve from the bolt. Turn out the small set-screw from the joint between the bolt sleeve and the bolt-sleeve cap, then turn off the cap. Rest the firing pin tip on a smooth hard surface, press the bolt sleeve and cocking piece down until the rear of the firing pin projects out of the bolt sleeve, then remove the divided firing pin collar. This allows firing pin, mainspring, cocking piece and bolt sleeve to be separated. To remove the safety, turn out the set-screw under the safety pin and push the pin out the front. The safety can then be removed. Turn out the Allen head bushing from the front of the bolt sleeve and remove the spring and plunger. Reassemble in reverse order.

To remove the ejector, drive out its cross-pin. To remove the extractor, depress the extractor plunger with the tip of a jeweler's screwdriver, then lift out the extractor.

Turn out the set-screw from the rear of the bolt-stop lug and remove the bolt-stop spring and plunger. Remove the set-screw from the

side of the bolt-stop lug; then pull out the bolt-stop pin and bolt-stop. Reassemble in reverse order, inserting the bolt-stop so the indents are to the rear.

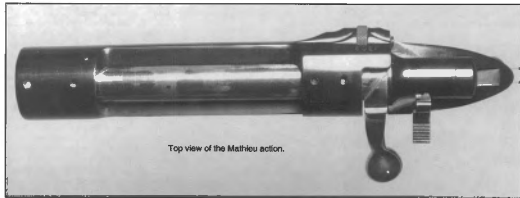
Remove the two guard screws, then the barreled action and the trigger guard/magazine can be removed from the stock. The trigger mechanism can then be removed. The barrel is threaded (right-hand threads) very tightly into the receiver; it is not easily removed unless the proper tools are available to do this right.

Comments

I wish I could have examined more than just one Mathieu action, but if I may judge the rest from what I learned about this one, I'd say they are good. This one, certainly, is very well made, and from the very little I've read about other Mathieu actions, they were well made, too. This particular action has seen a lot of service, and Dean Miller, its owner, told me he's worn out two barrels on it since he got hold of it. It was barreled both times to one of the Weatherby Magnum calibers, with the Weatherby shop installing the first barrel. I don't know how many times the action was fired, but there are no signs of heavy use, and it probably will outlast a few more barrels. This ought to prove that this action, at least, is a strong one. Miller, a left-hand shooter, likes this action and never has had any trouble with it. On this basis, it is also a reliable action.

Although there is no guide rib or any other anti-bind device on the bolt, its operation is smooth and easy.

Owners of Mathieu left-hand actions, or rifles built on this action, ought to hang on to them because there is no other centerfire turn-bolt action quite like it. Mathieu actions were never commercially made and have long since been discontinued, and may never be made again.



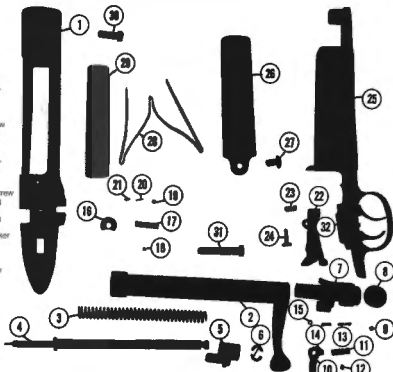
Top view of the Mathieu action.

Parts Legend

- 1 Receiver (top view)
- 2 Bolt
- 3 Mainspring
- 4 Firing pin
- 5 Cocking piece
- 6 Firing-pin collar (two pieces)
- 7 Bolt sleeve
- 8 Bolt-sleeve cap
- 9 Bolt-sleeve cap retainer screw
- 10 Safety
- 11 Safety pin
- 12 Safety-pin retainer screw
- 13 Bolt lock/safety-plunger
- 14 Bolt lock/safety-plunger spring
- 15 Bolt lock/safety-plunger, spring retainer screw
- 16 Bolt-stop
- 17 Bolt-stop pin
- 18 Bolt-stop pin-retainer screw
- 19 Bolt-stop plunger-spring screw
- 20 Bolt-stop plunger spring
- 21 Bolt-stop plunger
- 22 Sear (with attached rocker arm)
- 23 Sear pin
- 24 Sear spring
- 25 Trigger guard/magazine
- 26 Floorplate
- 27 Floorplate screw
- 28 Floorplate spring
- 29 Follower
- 30 Front guard screw
- 31 Rear guard screw
- 32 Double-set trigger mechanism

Not shown:

- Extractor
- Extractor plunger
- Extractor spring
- Ejector
- Ejector spring
- Ejector retainer pin



Mathieu Left-Hand Action

Dimensional Action Specifications*

Weight	44 oz.
Length	9.00"
Receiver ring dia.	1.307"
Bolt travel	4.950"
Striker travel	.390"
Bolt-face recess:	
Depth	.110"
Guard-screw spacing	8.00"
Magazine length	3.750"

*Mathieu actions were individually made—dimensions may vary. These specifications were taken from an action made for long belted magnum cartridges.

General Specifications

Type	Tumbolt repeater (left-hand).
Receiver	One-piece, machined from a solid steel bar stock with integral recoil lug. Non-slotted bridge. Tapped for top scope mounts.
Bolt	One-piece machined steel with dual-opposed solid forward locking lugs. Low-profile bolt handle serves as safety lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on up and down movement of the bolt handle.
Magazine	Non-detachable staggered-column four-shot box type. Detachable floorplate.
Trigger	Commercial single-stage type is usually installed, such as the Jaeger. Anschütz double-set trigger installed on action illustrated.
Safety	Low wing-type built into side of bolt sleeve; when engaged, locks striker and bolt.
Extractor	Hook type, built into bolt head.
Ejector	Plunger type, fitted into bolt head.
Bolt-stop	Rotary type, built on right receiver wall, stops bolt travel by contacting right locking lug.



Mauser Two-Shot Shotgun

NOT TOO MANY years ago, I participated in a jackrabbit drive for the sole purpose of getting first-hand information for a magazine article. I don't remember much about the actual hunt except that a small truck load of rabbits was killed by the seventy-five or so hunters who comprised the group. I remember clearly, however, the wide variety of shotguns these hunters used. Mostly farmers, their shotguns were of every make, model, type and gauge imaginable; from single shots, doubles, pumps and automatics to the "Mauser two-shot" bolt action—as they are referred to in my section of the country.

I got the chance to see all of their guns as the group assembled for a hot lunch on the grounds of a country school house. A snow fence along the edge of the grounds afforded an excellent stand for the many guns. As the hunters gulped down the hot coffee and doughnuts, I went slowly down the line of guns and, to my amazement, found that about one of every eight or ten was a German-made Gehe or other make of two-shot bolt-action repeater! I talked to some of the owners of these unusual shotguns, and they all insisted their guns were hard hitting and reliable, and that they thought a lot of them, despite the derogatory remarks some noted gun editors had written about them. Some of these guns were marked to assure the user they were indeed hard hitters, for the words **HEART** and **HARD HIT** were pressed into the buttstock.

Their Origin

There were hard times in Germany for a few years, following their defeat in WWI, and the peace treaty forced on them curtailed much of the military arms production on which much of their past economy had been based in good part. They were allowed to make sporting arms which, of course, they continued to do. As I piece the story together, Germany had large quantities of M98 Mauser rifles and/or parts of these rifles on hand, plus facilities to make them.

Why not make shotguns from them and dispose of them on the world market at competitive prices? This they did, during the early 1920s, and apparently on a grand scale, if one can judge by the number of guns still around at that time.

Briefly, the two-shot Mauser shotgun was made as follows: Starting with an M98 military rifle (or parts), the rifle barrel was removed and discarded. The collar and the locking shoulders in the receiver ring were then bored out from the front, and a shotgun barrel fitted. The front of the bolt was bored, and a special bolt head fitted. Various other things were then done to the action and magazine so it would accept and handle shotshells, such as installing a shell stop and guide; replacing the magazine follower and ejector; and altering the extractor, magazine and other parts, including remodeling the military stock. The result was a handy, lightweight and low-cost bolt-action repeating shotgun.

Description

I have seen many of these German-made M98 rifle-to-shotgun conversions, and while I've noted a number of variations, they're all about the same as the Gehe 12-gauge model pictured here. Most were 12-gauge, the weight about 6 pounds. Some were 16-gauge, and a very few were 20s. All were chambered for 2 $\frac{1}{4}$ " shells. The steel barrels, usually 26.5" long, were Full choked. The magazine held one shell, thus with a cartridge in the chamber one had a two-shot repeater. The front sight is a brass bead threaded into the muzzle; a small U-groove milled along the top of the receiver ring formed the rear sight. A steel buttplate, turned-down bolt handle and a single-stage trigger pull were also common features. The stocks are usually solid walnut (not laminated or two-piece) cut down from the original military stock and oil finished, with the metal parts polished and blued. The breech end of the barrel is usually stamped with a proofmark and the word **NITRO**,

indicating proof testing for smokeless loads. **GERMANY** in small type is usually stamped on the receiver ring.

Most of these I've seen were of the Gehe brand, usually having two large brass medallions marked **GEHA** (one on each side) inletted into the sides of the buttstock. These replaced the original metal firing-pin disassembly tool found in the original military stock. There are supposedly similar shotguns marked **GECO**, a brand name of Gustav Genschow & Co., A.G., formerly of Berlin, but I've never examined one. The only other brand I've seen was the Remo, discussed later in this chapter.

Some Gehe-marked guns have the word **BAYARD** stamped under the breech end of the barrel or receiver. Pieper of Belgium made a Bayard automatic pistol, but so far I have no information which would connect this firm with the Gehe guns, or even why the word "Bayard" was used.

Action Details

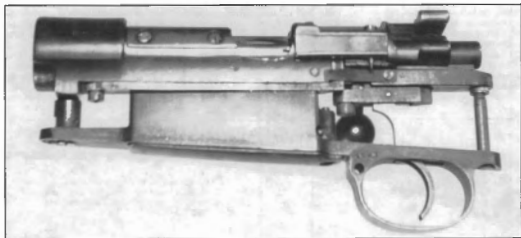
The regular large-ring M98 Mauser military action was used in making these shotgun conversions. Basic features which are unchanged or only slightly so are the trigger and firing mechanism, safety, bolt-stop and ejector, extractor and trigger guard.

The front of the bolt is faced off, and the firing-pin hole bored out to accept the new shotshell bolt head. The latter is machined with a stem to fit into the bored out bolt, its face only slightly larger than the head of the shotshell to be used. On the left of the removable bolt head, a slight forward extension aids in holding the shell in place for proper extraction and ejection. The extractor

(Above) German-made Gehe two-shot shotgun, once available in 12, 16 and 20 gauges. Many were imported and sold in the U.S. after WWI. These shotguns are based on a converted M98 Mauser military action. Those marked **Geco** are almost the same as the Gehe.



Three views—right side, top and left side—of a converted M98 action used in making up the Gehe two-shot shotgun.



PART II: Commercial Rifles & Actions



The Remo two-shot shotgun has a typical German ultra-slim sporter stock with schnabel-tipped forend, panels over the action section, checkered rounded pistol grip, thin comb and small cheekpiece.

hook is altered and shortened to a dull V-point which engages a matching V-groove in the right of the bolt head. This holds the bolt head in the bolt. A short extractor hook added to the front of the extractor engages the shotshell rim.

The receiver is bored out from the front to a diameter slightly larger than the bolt head for whatever gauge it is made, and bored rearward to a point about $1/2$ " into the receiver bridge. When made for a 12-gauge shotshell, this boring removes almost all of the metal of the collar and locking shoulder in the receiver ring, as well as considerable metal from the receiver rails and sidewall. Even in the 16- and 20-gauge conversions, enough metal is removed from the locking shoulder areas so that the original forward locking lugs no longer function. This job is taken over by the auxiliary, or safety, lug on the rear of the bolt body, engaging its notch in the bottom of the receiver bridge. In the 20-gauge, there may be enough metal left in the receiver ring for the locking lugs to gain a little purchase, but in the 12s and 16s, the rear safety lug is the only thing which locks and holds the bolt in the receiver when the gun is fired.

A longer ejector replaces the original, and it functions in the same manner.

A new flat-topped sheet metal magazine follower is used, and provision is made so that it cannot be pushed too far down or rise too high to interfere with the bolt. The top left edge of the magazine box is cut away for a

long shell-stop attached to the underside of the receiver, which pivots on a screw threaded into the receiver ring. The rear end of the shell-stop extends through a hole milled in the left of the receiver bridge and is activated by an inclined mill-cut in the left locking lug when the bolt is drawn entirely back. Only one shell can be pressed into the magazine, and it is retained therein until released by the shell-stop.

Another shell-stop or guide is provided to halt the upward motion of a shell being released from the magazine. This shell-stop, a piece of curved sheet metal screwed to the left receiver wall, extends over the top of the bolt.

Remo Two-Shot Shotgun

For many years, I was not aware of any other Mauser two-shot shotguns, other than the Gehe, but then I was shown the Remo shotgun pictured here, and now in the NRA Gun Museum. It is so different from the usual Gehe shotgun that I don't believe it to be entirely a conversion, but rather partly or entirely manufactured as a shotgun. As the photographs show, there's the distinctly continental-type sporting rifle stock on the Remo, and the receiver does not appear to be a conversion, either. The shell-stop is an integral part of the receiver, not a piece of sheet metal as on the Gehe. The rest of the Remo action is more or less the same as the Gehe, except for a feature or two that make the action work better. The Remo guns were made by Remo Gewehrfabrik, Geb-

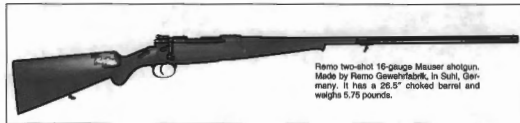
ruder Rempt of Suhl, Germany. I assume they were also made in the 1920s, perhaps in the 1930s as well, and most likely in 12, 16 and 20 gauges.

Evaluation

I have never heard a good word spoken for the two-shot Mauser shotguns except by their owners. Most experts generally have a low opinion of them. Mention is always made that only the single safety lug locks the bolt, and that if this lug should fail the shooter will get the bolt in his face.

For myself, I have never heard of, nor ever seen, one of these shotguns in which the locking lug failed—and I know men who have used them for years, firing many heavy duck and rifled slug loads in them. This is not to say that I advise firing these shotguns with heavy loads or even with regular loads, but I cannot imagine the safety lug shearing off. I believe the receiver side rails would break or part first. I've also asked many people well acquainted with these guns if they ever saw one that had failed or blown up, and none of them had.

The poorest feature of this action is the separate bolt head. Its flange is quite thin and easily broken. The two thin extensions on the left of the flange break off easily, and without them fired cases will not be ejected properly. The bolt head is not positively anchored to the bolt, and it is easily lost if it pops out. Most of these shotguns I've seen for sale lack the bolt head. They are then positively dangerous as they can be fired in

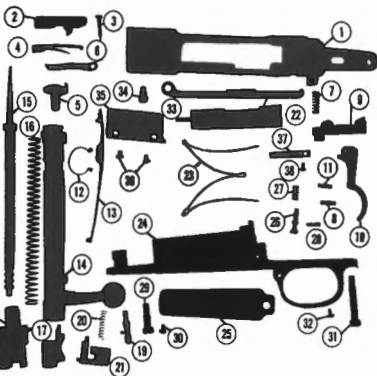


Remo two-shot 16-gauge Mauser shotgun. Made by Remo Gewehrfabrik, in Suhl, Germany. It has a 26.5" choked barrel and weighs 5.75 pounds.

Parts Legend

- 1 Receiver (top view)
- 2 Bolt-stop
- 3 Bolt-stop screw
- 4 Bolt-stop/Ejector spring
- 5 Bolt head
- 6 Ejector
- 7 Sear spring
- 8 Sear pin
- 9 Sear
- 10 Trigger
- 11 Trigger pin
- 12 Extractor roller
- 13 Extractor
- 14 Bolt
- 15 Firing pin
- 16 Main spring
- 17 Cocking piece
- 18 Bolt sleeve
- 19 Bolt sleeve lock
- 20 Bolt sleeve lock spring
- 21 Safety
- 22 Follower
- 23 Follower spring
- 24 Trigger guard/magazine
- 25 Magazine floorplate
- 26 Floorplate catch
- 27 Floorplate catch spring
- 28 Floorplate catch pin
- 29 Front guard screw lock
- 30 Front guard screw lock screw
- 31 Rear guard screw lock
- 32 Rear guard screw lock screw
- 33 Shell-stop
- 34 Shell-stop screw
- 35 Shell guide
- 36 Shell guide screws (2)
- 37 Shell-stop spring
- 38 Shell-stop spring screw

*These are the parts added to the M98 Mauser action when it was converted to handle shotshells.



this condition, which, incidentally, results in considerable fireworks spurring out of the action! The seller of such a gun has a moral obligation to advise the prospective buyer that the bolt head is missing. I believe some of the stories that have been told about these guns "blowing up" may well have been about guns without the bolt head, not because of some basic failure of the action or barrel.

From the above, the reader can see that I am not in full accord with the many gun experts who rate these guns as pure junk. I'm not going out on a limb, however, and say that these shotguns are safe to fire—but, as mentioned before, I have never seen one that failed, nor ever heard of an authentic case where one failed. Therefore, if you have one of these shotguns, you will have to make up your mind about its safety, whether it is junk or not, or whatever.



Comparison views of the Remo (top) shotgun with the common Geha.



Mauser Model 98 Sporters

IN THIS CHAPTER, I will briefly discuss variations of the M98 action used to build sporting rifles, and review the various sporting rifles made in Europe and Great Britain between the introduction of this action in 1898 and the WWII period. I will also describe, in more detail, two set trigger mechanisms often used in these rifles.

Shortly after Mauser in Oberndorf (Germany) began making military rifles on the M98 action, they began making fine sporting rifles on the same action. In due time, Mauser also made these actions available to other arms firms in Germany and other countries on the continent, as well as to Great Britain and the United States. As other German firms began manufacturing M98 military rifles, they also started using their own M98 actions for sporting rifles.

A great many firms, besides Mauser, made sporting rifles on the M98 action. In Germany, this included such well-known firms as J.P. Sauer & Sohn, Remo, Kriehoff, Merkel, C.G. Haesel, and such lesser known firms as Halger, Vonn Hofe, Brennecke and others. Many little-known individual German gunsmiths used both commercial and military M98 actions on which to build a wide array of sporting rifles in many standard and wildcat calibers. Model 98 sporters were also built in Belgium, France, Switzerland, Czechoslovakia and other European countries. In the British Isles, practically every well-known gunmaker made sporters on this action, with names like Gibbs, Rigby, Holland & Holland, Westley Richards, Greener, Vickers and others often appearing on these fine rifles. Griffin & Howe, Hoffman, Pachmayr and other American gunmakers also used these actions for building sporters. For many years, Stoeger Arms Corp. imported the "original" Mauser Oberndorf actions and rifles, while such firms as Abercrombie & Fitch imported others, including some of the better British-made Mauser rifles. All in all, there never was an action more widely used for sporting rifles than the M98 Mauser.

M98 Sporting Actions

Most of the better makes of Mauser sporting rifles were based on actions usually considered "commercial" types, as opposed to those made for a military rifle or reworked from a military action. Even so, the commercial sporting action was essentially the same as the military, and most parts were interchangeable. The commercial action, however, was generally made to closer tolerances, better finished, and smoother in operation. In many cases, the commercial actions featured a quick-release floorplate or a magazine floorplate hinged to the forward part of the trigger guard.

Mauser sporters were made for a wide variety of cartridges, and for the most part, the standard-length action was used—that is, an action 8.75" long, the same length as the standard M98 military action made for the 8mm Mauser cartridge. This action was made for, or modified to accept, magazine boxes of various lengths to handle cartridges of different lengths. The Mauser firm alone listed twenty different action numbers, most of them the standard action with different magazine lengths. In some cases, the magazine depth was increased to handle fatter cartridges.

Mauser, as well as some others, also made "short" and "long" magnum actions. The true short Mauser actions, about 8.00" long, are fitted with a magazine of proper length for the various cartridges of 6.5x54mm length or shorter. The "short" military action used on 7mm Mexican Mauser rifles is about 8.50" long, but I don't know if this action was ever made commercially for sporter use. The magnum, or long action, about 9.25" long, is intended for cartridges longer than the 30-06. Of course, to the best of my knowledge, at least none of these original Oberndorf or other similar commercial Mauser actions are available today, and to the best of my knowledge, neither are the standard FN Mauser action (8.75") and the Brexev Magnum action

(9.50"). Although I have never seen them, a couple of more other shorter Mauser M98 actions were also made at one time.

Sporting rifles built on these actions followed several distinct styles or types. I won't describe these in detail, but briefly they're as follows:

European made for European trade (as illustrated): Such rifles were quite light, with very slim, tapered barrels about 20" to 24" long, and had the typical German "toothpick" stock. Some barrels were round, some part octagonal and round, some full octagonal, and some fluted; any of them might have a raised matted rib. The most common open sights were two- or three-leaf rear and a bead front sight mounted on a ramp. The walnut stock carried a steel or pressed-horn buttplate and pistol grip cap (early ones usually had a round-ended grip), a checkered grip, short and slim tapered (usually uncheckered) forend which ended in a schnabel tip, small cheekpiece and thin comb. The lightest of these stocks had raised panels along the receiver sides. Narrow sling swivels were fitted to the buttstock and to the barrel, several inches ahead of the forend tip. Double-set triggers were quite common, but the rifles could also be had with a single-set, single-stage or double-stage triggers. The

(Above) A classic German sporting rifle (maker unknown). Based on the military M98 small-ring Mauser action, it has a distinctly German-styled stock of minimum proportions. The checkered buttplate and sunburst pistol grip cap are made of pressed buffalo horn. Note the panels over the action and the small schnabel forend tip. The receiver, trigger guard and floorplate are fully engraved and color case-hardened. The flat bolt handle is checkered, and the action is fitted with a double-set trigger mechanism. The very slim tapered barrel, 24" long, carries a full-length raised matted rib to which the sights are attached. Chambered for the 9x57mm cartridge, it weighs 6½ pounds.



Typical German sporting rifles made on the M98 Mauser action usually have the stock made with distinct raised panels the length of the action, checkered and capped pistol grips, and double-set triggers. Many also have flat or "spoon-shaped" bolt handles.

carbine styles were usually made with a slim, full-length forend finished off with a steel muzzle cap and a clevis-type front sling swivel.

The rifle telescope sight (developed in Europe) was held in the typical and classic "hook-" or "claw-type" two-piece mounts. These, spanning the bridge and receiver, were quickly detachable. These mounts usually place the scope very high over the receiver, but despite the scope's ready removability, holes or tunnels in the mounts also allowed the use of the open sights with the scope in place. In many cases, the front scope mount base was dovetailed into the receiver ring rather than being attached with screws or attached to the breech end of the barrel.

European made for British trade: These were similar to the above rifles except the stock was usually made a bit fuller, which did away with the side panels; the front of the forend was tipped with ebony or horn and rounded; the forend was checkered, and usually sling eyelets or swivel studs were fitted instead of swivels. The British preferred rifles with a plain trigger and round barrel, although the rifles could be ordered with any regularly furnished accessory.

European made for African sportsmen: Mauser—and perhaps some others—made such rifles with very long barrels (about 29") and with a slim uncapped forend that went nearly to the muzzle. This model is not common.

Bavarian style: This sporter variation is distinguished by a larger and longer cheekpiece, made with a pronounced corner. These sporters usually have a slightly fuller stock than most German-made sporters, and a longer forend and differently shaped schnabel. These rifles often have a separate shotgun-type trigger guard. The bolt handles are often flat or "spooned," or made with a round shank with a grasping ball in the shape of an acorn.

British made: The classic British Mauser

carb-action sporting rifle has a round barrel up to about 24" long, fitted with a multi-leaf "express-type" open rear sight and a bead front sight on a ramp base; a dark walnut stock moderately full proportioned with a short, round-ended forend; and a standard single-stage trigger. The bolt handle is generally conventional, with a round grasping ball; the forend is usually tipped with a piece of buffalo horn or ebony, the grip and forend checkered. Gaudy decorations like white spacers or contrasting stock inlays are unheard of on these rifles. The front sling swivel stud, or eyelet, is almost always attached to the barrel, ahead of the forend tip.

American made: This category is endless, but I'll limit it to the better pre-1940 era "classic" types as represented by those rifles made by such notable gunmakers as Hoffman and Griffin & Howe. These rifles were patterned largely after the British-made Mausers, except that the forend was usually made longer, and the front sling stud was attached to the forend. The general stock lines followed British design—straight comb, small- to medium-sized cheekpiece, diamond-shaped checkering panels, and a dull oil-type finish. Because it was fuller and had a longer forend, the American classic sporter stock weighs about a pound or so more than the typical German toothpick sporter stock, and about a half-pound more than the British. The American classic Mauser sporter was usually fitted with a band-type ramp front sight and a rear receiver sight, and/or with a short hunting scope in a classic detachable side mount like the Griffin & Howe or Jaeger.

The Double-Set Trigger

For the great many years that sporting rifles have been built on M98 actions, it has been,

The same Mauser action as above, showing engraving details on the trigger guard and magazine floorplate.



Double-set trigger commonly used on M98 Mauser sporters

Parts Legend

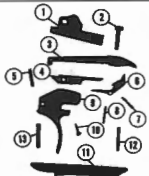
- 1 Sear Lever
- 2 Mainspring Screw
- 3 Mainspring
- 4 Front (pull) Trigger Spring
- 5 Front (pull) Trigger
- 6 Rear (cocking) Trigger
- 7 Rear Trigger Screw
- 8 Front Trigger Pin
- 9 Adjustment Screw
- 10 Trigger Housing
- 11 Housing Pin (Front)
- 12 Housing Pin (Rear)



Single-set trigger of a German M98 Mauser sporter

Parts Legend

- 1 Sear Lever
- 2 Mainspring Screw
- 3 Mainspring
- 4 Sear Lever
- 5 Trigger Pin
- 6 Sear
- 7 Sear Spring
- 8 Sear Pin
- 9 Trigger
- 10 Adjustment Screw
- 11 Trigger Housing
- 12 Housing Pin (Rear)
- 13 Housing Pin (Front)



Typical German M98 sporter (maker unknown) stocked with a full-length "Männlicher-type" forend and early-type stock with uncapped round-end pistol grip. The action is a military M98a, the barrel made by the Spandau arsenal in Berlin. The barrel is 24" long, the bolt handle is flat, and the trigger is a single-set type.

and still is, normal practice to substitute a different trigger mechanism for the double-stage military trigger. The favorite trigger mechanism used by Mauser, and by most European gunmakers, was the common double-set trigger.

The firing mechanism of the M98 action consists of two assemblies: 1) The firing pin, mainspring and cocking piece assembled in the bolt and bolt sleeve; 2) the sear, sear spring, trigger and pin, attached to the bottom rear of the receiver. On closing the bolt, the sear, which has a projection extending upward into the cocking piece raceway, holds the cocking piece back against the tension of the mainspring on the firing pin. Normally, there is considerable looseness of the bolt in the receiver which extends to the cocking piece, and to make up for this play, sufficient sear engagement is required on the cocking piece to positively hold the action cocked. The first stage of the military double-stage pull moves the sear almost all of the way off the cocking piece, while the second-stage pull, which is shorter and heavier than the first stage, finally disengages the sear from the cocking piece to fire the rifle.

The double-set trigger is merely a miniature hammer-and trigger mechanism—an auxiliary lock mechanism which can be adjusted to a very light pull. When fitted to the action it provides a means of tripping the fully engaged sear off the cocking piece.

In the double-set trigger mechanism, which gets its name because of its "two trigger"

appearance, the rear trigger is actually a "hammer" and the front trigger is the "trigger" to that "hammer." I usually call the rear trigger the "cocking" trigger, for it must be cocked if the set triggers are to be used, and the front trigger the "firing" trigger, since it must be pulled to fire the rifle whether the set mechanism is used or not. Like a hammer on a hammer-type firearm, the rear trigger has its own mainspring to give it power. With the regular trigger in the sear replaced by a short lever, the cocked rear trigger when released strikes the sear lever and causes the sear to disengage from the cocking piece to fire the rifle. The double-set trigger is cocked by pulling the rear trigger back under tension of its mainspring until it is caught by the front trigger and held back, and released again by pulling the front trigger. The small screw between the triggers is the adjustment screw, which controls the amount of engagement between the front and rear triggers, and it is possible to adjust the set trigger mechanism to a very short and light pull.

The upper arms of the double triggers are so arranged that either one can contact the sear lever, hence the rifle can be fired in two ways. One, already described, is to cock the mechanism and then release the cocked trigger so it strikes the sear lever. The second way is to merely pull the front trigger back until it releases the sear. Because of the full engagement of the sear with the cocking piece, and because the front trigger must of necessity be

placed in a poor leverage position with the sear lever, in firing the rifle by this second method the let-off is usually long, creepy and heavy. However, a good double-set trigger, properly tuned and adjusted, can have an excellent, crisp let-off when unset.

On most of the M98 sporting rifles which were originally fitted with a double-set trigger mechanism, the trigger guard was made with an integral housing to accept the set trigger parts. Most other gunmakers, however, when making sporters on this action, usually installed a mechanism contained in its own housing, fitting this unit into the regular trigger guard. These units are generally held in place by two small pins.

Double-set trigger mechanisms made for the M98 action are still available. Installation is not an easy job, but not beyond the ability of the average home gunsmith who can manage a file. (Incidentally, these mechanisms can also be installed in other bolt actions as well, including the 1903 Springfield, 1917 Enfield and M93 to M96 Mauser actions.)

The Single-Set Trigger

A "single-set" trigger mechanism is a miniature firing mechanism having the same function as a double-set trigger, but it has only one visible trigger. They're usually found on combination rifle/shotgun arms, but they were often used on single shot rifles and pistols as well. Their use on bolt-action rifles has been somewhat limited, but many European gun-

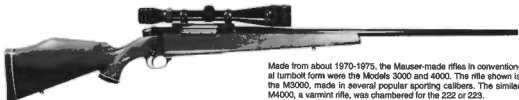
PART II: Commercial Rifles & Actions



Another example of an M98 Sporter. The thumb notch in the left wall of the receiver probably indicates that this German sporting rifle was built on a military M98 Mauser action. Most German sporting rifles like this one were often fitted with high mounted scope; narrow carrying strap sling swivels, one fitted to the stock and the other to the barrel (not shown in this photo); and a schnabel forend.



An amateur gunsmith built this fine sporting rifle on a short Model 98 Mauser action. It is stocked with a Reinhardt Fajen "German Classic" sporter stock with reshaped schnabel and fitted with a pressed horn buttplate and pistol grip cap of typical German pattern. The front sling swivel is attached to a band fitted to the barrel. The rifle has a 24" barrel and German double-set triggers.



Made from about 1970-1975, the Mauser-made rifles in conventional turnbolt form were the Models 3000 and 4000. The rifle shown is the M3000, made in several popular sporting calibers. The similar M4000, a varmint rifle, was chambered for the 222 or 223.

smiths offered the customer a choice of a double- or single-set trigger on M98-actioned sporters. In most cases, the single-set trigger was built in a separate housing and installed into the trigger guard via two pins.

The single-set trigger is powered by its own mainspring, the mechanism cocked and released by this trigger, with the trigger becoming the "hammer." To "set" or cock the mechanism, the trigger is pushed forward with the tip of the thumb until it is cocked; on being released by pulling it back, the trigger, under mainspring tension, snaps back to strike the sear lever. A small screw behind the trigger allows adjustment to a very light pull. The rifle can also be fired in the normal way without setting the trigger.

The single-set trigger, more intricate and more difficult to make than the DS trigger, is generally not fully as reliable or as trustworthy. The SS trigger cannot usually be adjusted to as light a pull as the DS type. Both are about equally easy to cock and use—provided

the shooter is familiar and practiced in their use. The SS trigger is easier and more safely uncocked after having been cocked. Rifles with a SS trigger usually have a better unset trigger pull. This is largely because the SS trigger is placed farther back in the guard and is easier to reach.

Summary

German sporters are interesting to look at and handle. In suitable calibers, they're fine for hunting big game. British-style Mausers are excellent for hunting, generally more comfortable to fire, and easier to carry and point than the German-styled sporter. The American classic sporter is more comfortable to shoot than either of the others, and this stock style is first choice of the three if the rifle is to be used for varmint or target shooting, when many shots may be fired in a short time. After witnessing three decades of stock design experimentation by almost everyone, which resulted in many design fads like roll-

over combs, flared pistol grips, thumb-holes, spacers, slanted forend tips, etc., etc., it is refreshing to see shooters beginning to come back to the classic designs.

The German sporter was a prized souvenir for the GI stationed in Europe during WWII, and many sporters were sent home. Many are chambered for the common 8mm Mauser cartridge, and when handloading this cartridge, be sure to check groove diameter of the barrel, as many German gunsmiths preferred undersized bores. It may be necessary to use .318" 8mm bullets rather than the .323" or "S" bullets. Also, those rifles which have the front scope base deeply dovetailed into the receiver ring should not be subjected to heavy loads, since such receivers have definitely been weakened.

Original M98 Mauser sporting rifles regardless of who made them have been prized collector items. I have had no opportunity to do it, but an entire book could be written about these rifles.



1. Centurion
2. Santa Barbara
3. Herter's XK3, J9
4. Ackley
5. Brevex Magnum

Mausers, Miscellaneous Commercial

1. Centurion Mauser

IN 1965, GOLDEN State Arms Corp. (no longer in business) introduced a commercial sporting bolt-action rifle based on the M98 action design. More precisely, the Centurion action appears to be a direct copy of the now-obsolete commercial Firearms International FN Deluxe action, except for an alloy hinged floorplate/trigger guard and a slightly different bolt handle.

The Centurion action is readily identified, but only if it is complete and out of the stock. Imprinted on the left wall of the magazine, in three lines, is:

CENTURION (in script)
GOLDEN STATE ARMS CORP.,
PASADENA, CALIF.

The word SPAIN is inconspicuously stamped on the left side of the receiver tang, indicating the action was manufactured in Spain. The actions are serial numbered, with the number, preceded by a letter, stamped on the left of the receiver ring. On the Centurion barreled actions, the barrel is marked with the caliber designation, plus the single line PASADENA ARMS CORP., INC.

The receiver appears to be machined from a die forging. The literature describing the Centurion action, when it was introduced, does not state the type or number of the steel the receiver and bolt are made from, but undoubtedly they are made of a suitable modern steel.

The receiver is of the large ring type. The collar inside the receiver ring extends entirely around it except for the extractor cut, as in the M98 military action. This is unlike the late FN Mauser action, whose receiver ring collar is milled out on the left side to match the extractor cut on the right. Because of this, the Centurion receiver ring may well be stronger than that of the FN. The Centurion has no thumb slot in the left wall and no clip-charger guides, and the top of the bridge is smooth. Four correctly spaced

6x48 tapped holes, two in the bridge and two in the ring, allowed all of the popular scope mounts to be used on this action. The receiver was well machined with an even, smooth surface.

The bolt is of the standard M98 pattern, but the bolt handle is shaped for the lowest scope mounting possible. All bolt components are M98 copies, except that the bolt sleeve had a groove cut into it for a low scope safety positioned to its left side. The safety locks both the striker and bolt when swung upward. The extractor is made so it will easily snap over a cartridge rim when the bolt is closed on a cartridge dropped into the chamber. All bolt parts are well made.

The trigger is practically the same as the original M98 military type, except it has only one hump for a single-stage pull instead of two humps for the double-stage pull. The trigger pull is quite long and heavy.

All receiver and bolt parts are of steel, properly machined for a smooth finish and close fit, and given a very good polish. There is no evidence of any welding. The parts were left in the "white" on the actions, but blued on the barreled action.

The trigger guard, with its integral magazine box, is an alloy casting. The alloy floorplate is hinged to the guard, its latch in the front of the guard bow. It is released by pressing a button inside the front of the guard bow. The follower is of milled steel, its rear surface sloped to allow closing the bolt on an empty magazine. The alloy parts (guard, floorplate and latch) are anodized black.

Centurion actions were made to handle most popular U.S. centerfire cartridges of 30-06 head size and the short belted magnums.

The actions were all of the same length, but those intended for shorter cartridges had the rear of the magazine blocked off and fitted with a shorter follower. Thus, actions made for the 243, 6mm, 257 and 308 have a magazine opening (length) of 3.00". Actions for the longer cartridges—30-06 and short magnum

length—have a magazine opening of 3.350" and are unblocked.

Evidently, a great many Centurion actions were made, since the actions, barreled actions and assembled rifles were numerous and sold by many dealers. The few I have examined appeared sound and well made, but one 243 would absolutely not feed any cartridge from the magazine except the last one. An isolated instance, perhaps, for others I handled didn't have this problem. I also fear that the latch arrangement of the hinged floorplate is not good; the tiny lip on the floorplate which engages the latch may wear quickly and then fail to hold the floorplate closed when the magazine is fully loaded.

The Centurion action weighs about 2 pounds, 11 ounces. Its general and dimensional specifications are the same as those of the standard M98, including barrel shank and thread specs, disassembly and assembly.

The lowest priced Centurion rifle, the Model 100, had a blind magazine box—that is, no outside magazine floorplate was used, the wood of the stock covering the bottom of the magazine box. Cartridges have to be unloaded by working the bolt.

Sometime in 1966 or 1967, the Golden State Arms Corp. went out of business. I had a letter from one man who said his Centurion receiver and bolt were tested for hardness before having a 7mm Magnum barrel fitted. The gunsmith making the test wrote that he considered the receiver too soft for any magnum cartridge.

To the best of my knowledge, this action and the rifles built on it are no longer imported into the U.S.

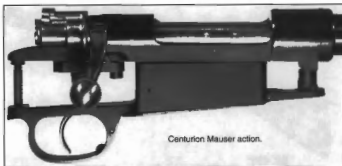
(Above) The obsolete Deluxe Centurion rifle in 243-caliber as assembled by Pasadena Arms Corp., Inc. The scope is a Bushnell 3-in. Bannar variable in Weaver top-ditchable mounts.

2. Santa Barbara Mauser

I don't know what connection there is between the Santa Barbara Mauser action and the Centurion Mauser action (just described), but there must be some link. I say this because the receivers and bolts of these two actions are almost exact duplicates of each other. The Centurion receiver itself has no markings by which it can be identified; the only markings it has are the serial number, preceded by a letter and the word SPAIN stamped on the side of the tang. The Santa Barbara receiver is similarly marked, its serial number beginning with the letter Z. There are no markings on the action to indicate it is a "Santa Barbara" action or any other action. Why the name stamping is omitted is beyond me. The Santa Barbara actions were first advertised shortly after Golden State Arms went out of business, so I suspect both actions were made by the same manufacturer in Spain. Although I am not sure about this, I have a report which indicates the bolt and receiver parts were made by the Spanish Military Arsenal in La Coruna, Spain. The Santa Barbara action was imported by Santa Barbara of America, Ltd. (no longer in business).

When the Santa Barbara action was available, it could be had with either an aluminum alloy or steel trigger guard and floorplate, and made to handle either standard cartridges of 30-06 head size or short belted head magnum cartridges. At the same time, barreled actions were available from a barrel making firm in various calibers. Lastly, complete rifles also were available from still another firm—a stock manufacturer. Neither the actions, barreled actions or complete rifles were on the market very long.

With a Santa Barbara action in hand just as



Centurion Mauser action.

I received it, I will attempt to describe it.

The receiver, bolt and some of the other larger parts appear to me to be investment castings, although I am not sure. There is, however, no valid objection to such castings provided suitable steels are used and the castings are finished and properly heat-treated. Like the Centurion and FN actions, the Santa Barbara is a near carbon copy of the M98 action. The advertising literature describes it as the "Time-tested, classic Oberndorf-designed rugged Mauser action." Like the FN, it is an improvement over the original M98. The thumb notch is omitted, leaving the left receiver wall solid. The stripper-clip guide notch is also left off and the bridge is left smooth.

The receiver has the near-full inside collar, the bolt has the two large gas-vent holes, the slotted left locking lug and the rear safety lug—all basic Mauser features. All receiver and bolt parts are the same as in the Centurion action except for a streamlined bolt sleeve.

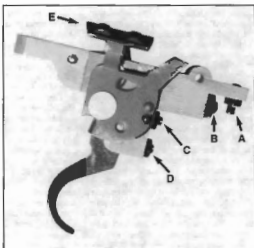
Because the safety was incorporated with the trigger mechanism, the usual Mauser-type safety was eliminated from the bolt sleeve and made smoother in outline by omitting the hole for the safety. The top rear of the bolt sleeve extends over the cocking piece when it is in the fired position, forming a sort of shroud to protect it.

The bolt handle is exactly like the one on the Centurion action, with a very low profile to clear a low-mounted scope.

Offhand, I would say that this action has a stiffer mainspring than that used in any of the other commercial M98-type actions.

The trigger mechanism is of the familiar type such as made by Timney. It is fully adjustable and is housed in an alloy casting. The mechanism is attached to the bottom of the receiver by a pin through the regular sear socket and tightened by a set-screw. The finger-piece of the trigger is well curved, grooved and placed well back in the trigger

The Santa Barbara Mauser trigger mechanism. Built in a cast aluminum housing, this trigger is fully adjustable for weight of pull, take-up (creep or sear engagement) and over-travel. Incorporated with the trigger mechanism is the pivoting-type tang safety; pulling it back locks the sear. There are four set-screws in this trigger, each one fitted with lock nuts. Set-screw and lock nut (A) are used only to hold the mechanism against the bottom of the receiver tang. The set-screw is turned in tight; then the lock nut is tightened so the set-screw can't loosen. The stock must be removed before any adjustments can be made. Set-screw (B) adjusts weight of pull. Turning it in (clockwise) increases the weight, and vice versa. Set-screw (C) adjusts trigger over-travel. It is normally set to stop trigger movement the moment the sear is released. The best way to adjust, or set it, is as follows: With the bolt closed and the striker in the fired position, turn the screw in until it is stopped, then back it off about one-eighth turn and tighten the lock nut. Set-screw (D) controls sear engagement. Turning it in (clockwise) reduces engagement, and vice versa. It is normally adjusted as follows: With the action closed and striker in the fired position, and after the set-screw (C) has been set, turn the screw in until stopped, then back it off about one-eighth turn and tighten the lock nut. Now, test the trigger by closing the bolt smartly a number of times, and if the striker does not stay cocked each time the bolt is closed, there is not enough sear engagement, and/or the weight of pull is too light. (E) is the safety. These instructions also apply to the trigger of the Parker-Hale Super Mauser rifle.





Santa Barbara Mauser action, a modernized Spanish-made version of the standard M98 action.

guard bow. It is adjustable for weight of pull, take-up or creep, and over-travel. It has a minimum weight-of-pull adjustment of about 2 pounds.

The safety is built into the trigger mechanism. It is a pivoting type, its thumb-piece positioned on the right side of the tang. Pivoting the safety back locks the trigger and bolt. It is convenient to use and quiet in operation. Since it pivots instead of sliding, the stock has to be slightly cut out to the rear of the thumb-piece to give it room to work.

The very long trigger housing extends nearly to the end of the tang, with the rear guard screw passing through a hole in the housing. This leaves very little area for the tang to be solidly bedded into the stock, even if a glass-bedding compound is used. For more secure bedding, the bottom of the trigger housing at this point should be bedded or "bottomed" into the stock instead.

The steel or alloy trigger guard/magazine units are made with a hinged floorplate, its latch and release button built into the front of the trigger guard bow. The aluminum unit is a one-piece casting, while the steel unit has a sheet-metal magazine box spot-welded to the trigger guard plate. The follower is steel in both types.

The magazine box opening is about 3.380" long, adequate for 30-06 length cartridges and short belted magnums. For the shorter 308 family of cartridges, the magazine has a sheet-metal spacer fitted into the rear of the box to shorten the opening to about 3.00". The alloy unit is anodized black, and the steel unit is polished and blued.

I ordered a Santa Barbara action with the steel trigger guard/magazine from a distributor, and the action I received was generally well made. Although the outside surfaces of all visible parts were well polished, nothing at all was done to the inside surfaces. The bolt was so stiff that it was only with great difficulty that it could be opened and closed. In

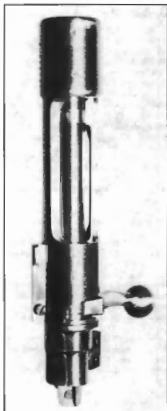
taking the firing mechanism out of the bolt, I could hardly pull the cocking piece back or turn the bolt sleeve. The inside metal surfaces, unpolished, had a frosty appearance, as though nothing had been done to them after manufacture except pickling or sandblasting, at a guess. To make this action work smoothly will take a lot of work, though. The action became noticeably easier to operate after working it a few times. The locking lug raceways, and the locking shoulders, will have to be polished and lapped; bolt sleeve threads will have to be lapped with those inside the bolt. The cocking cam notch in the bolt and the cam raceway in the receiver need to be polished. The inside of the bolt sleeve needs to be smoothed out, and it would be a good idea to smooth the inside of the bolt also. The outside of the bolt needs to be made much smoother. The extractor cam surfaces need to be polished.

Earlier, I mentioned the seemingly very stiff mainspring used in this action; in checking the striker travel, I found it to be .475" instead of the usual .500" for most M98-design actions. With the mainspring as stiff as it is, I believe the sear notch could be cut back .100" to reduce striker travel to .375". This could easily be done since the safety functions on the trigger sear rather than on the cocking piece.

I have not seen the Santa Barbara alloy trigger guard/magazine unit, but the steel unit on any action was poorly shaped before being polished and blued. The trigger guard bow is slab-sided and heavy, and the edges are square and sharp. On a light rifle, in 270 or larger caliber, the sharp-edged bow could really hash up the middle finger on recoil. The bow should be reworked, the edges tapered off and rounded.

Also, I don't like the flat-head guard screws used on this action.

With new guard screws and after considerable polishing has been done, I would rate the



Top view of the Santa Barbara action.

Santa Barbara Mauser action as a suitable one on which to build a good sporting rifle.

The receiver will accept barrels threaded to M98 barrel shank and thread specifications. The action with alloy guard weighs about 2 1/4 pounds, while the steel guard version weighs about 3 pounds. It is disassembled and re-assembled like the Series 400 FN Mauser action.

The well-known Parker-Hale firm of Birmingham, England, introduced a new high-powered sporting rifle in 1967, called the Series 1200 Parker-Hale Super Mauser. The receiver and bolt of this action are also of Spanish manufacture, as well might be the trigger. At any rate, the receiver, bolt and trigger mechanism of the Parker-Hale rifle appear to be identical to those on the Santa Barbara action, and I suspect that both are made in the same factory in Spain.

Since the Parker-Hale Mauser was introduced, various gun magazines reported favorably on it.

3. Herter's XK3 and J9

In the mid-1960s, Herter's, Inc., began importing a centerfire turnbolt action which appeared to be a very close copy of the FN Mauser Deluxe action, except for its bolt-stop. Cataloged as the Mark XK3, it was made in Germany and was described in their 1966 catalog as being an "improved modified Mauser type action." Actually, it was a modified version of the regular M98 large ring action. It was of all-steel construction and completely finished, with the receiver and magazine parts blued and the bolt parts left bright.

The Mark XK3 bolt had the usual M98 twin locking lugs, bolt safety lug, long-type extractor and guide rib. The bolt handle copied the FN low profile to clear a low-mounted scope. The safety was in the bolt sleeve, its wing toward the left, and it was also low enough to clear a low-mounted scope.

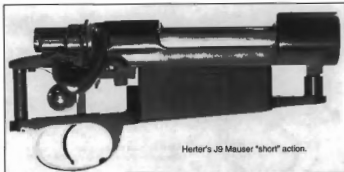
The large-ring receiver, tapped for top scope mounts, had the usual M98 collar inside. The trigger was a conventional Mauser military trigger made without the two humps, so it would have a single-stage pull instead of a double-stage let-off. The milled steel combined trigger guard/magazine had a detachable floorplate.

The usual M98 bolt-stop was not used on this action; instead, it was fitted with a nearly flush combination bolt-stop and ejector. It resembled the bolt-stop used on the Browning FN action described in another chapter. I have only seen one of these actions, and the bolt-stop assembly differed from the Browning type in that the bolt-stop spring was attached to the receiver by a screw.

These German-made Herter's XK3 actions were listed as being available with magazines for 308 and 30-06 length cartridges, or with the bolt face and extractor made for the short belted magnum cartridges. This action weighed 2 pounds, 9 ounces. They were marked **Made in Germany**.

I did get to examine a specimen of the Herter's Mark XK3 action at a later date, but this action was marked **Made in Yugoslavia**. It was also marked **HERTER'S M-XK-3**. It also bore a monogram, the overlapped figures **ZCZ** within a circle, the trademark of Zavodi Crvena Zastava, the leading arms manufacturer in Yugoslavia. This probably means that Herter's might have had problems in getting the actions made in Germany. The Yugoslavian-made XK3 action I examined had the conventional M98 bolt-stop and ejector, a smooth bolt sleeve made without safety, a sliding side-tang safety, and an all-steel trigger guard/magazine with a hinged floorplate. The collar inside the receiver ring is slotted on both sides. There may well have been other versions of the XK3 action, but the two I examined and described above appeared to be very well made.

Herter's 1967 catalog listed still another M98-type action. Called the Mark J9, Herter's



Herter's J9 Mauser "short" action.

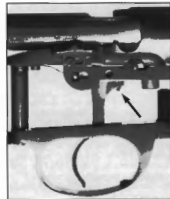
says it was made for them in Yugoslavia. This action appears to be exactly like the latest J9 action, described below, except that the top of the receiver ring and bridge are equal in height, flat on top, and with low dovetail grooves on each side (about .770" wide) to form integral scope mounting bases. I have never examined this action.

One gun writer reported to me that he had a rifle with a similar action and so marked except for the Herter's J9 stamping. This was obtained in Yugoslavia, in 30-06 caliber, and with serial number 48521. The receiver collar is slotted on both sides. He also had one of Herter's XK3 rifles, quite like the one I described except that the collar in the ring is cut out only on the right side.

Now for the most recent of the Herter's J9 action. The action I received is stamped on the left receiver wall:

MADE IN YUGOSLAVIA

This is preceded by the ZCZ-within-a-circle trademark. The serial number, stamped on



Trigger and safety mechanism of Herter's J9 action. Arrow points to the trigger adjustment screw. Turning this screw clockwise reduces sear engagement and shortens trigger pull.

the lower right corner of the receiver ring, would be hidden if the action were in the stock. The last three digits of the serial number are also stamped on the bottom of the bolt handle and on the trigger guard.

The Herter's catalog listed three J9 actions: the SSM1 No. 1 for cartridges of 308 length, SSM2 No. 2 for those 30-06 length cartridges, and SSM3 No. 3 for short belted magnums. J9 barreled actions and complete J9 rifles in various calibers were also listed.

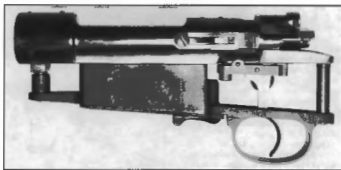
Briefly, Herter's J9 action is a modified and modernized version of the large ring M98 actions, made entirely of steel. It has the full receiver collar like the M98, and it is threaded the same. It has the M98 bolt fitted with a low-profile bolt handle. It has a solid left wall and a M98 bolt-stop and ejector. The bolt sleeve is of the modern FN type, without safety. The trigger guard/magazine box is all-steel and the steel floorplate is hinged. The floorplate latch lies in the front of the trigger guard bow. The trigger follows the M98 military type, but it has a single-stage pull. A sheet-metal sliding safety, fitted to the right side of the receiver tang, locks the sear and bolt when pulled back.

Here are the specifications of the J9 action I received, which I assume to be the SSM1 No. 1:

Weight	46 oz.
Length	8.50"
Receiver ring dia.	1.406"
Bolt travel	4.40"
Magazine length (inside)	3.215"
Bolt length	6.115"

(The standard M98 bolt is 6.375" long.)

From the above specifications, it can be seen that this action has the same approximate dimensions as the M24 Yugoslavian action described in the chapter "Mauser Model 98." In that chapter, I described this action as one having the odd breeching, in that the projecting lips on the left side of the cartridge recess rim are absent, letting the barrel be breeched closer to the bolt. This also required the face of the barrel to be notched for the extractor. All illustrations of the J9 bolt head in Herter's catalogs show it without these lips, and the J9



Left-side view of the XK3 action showing the nearly flush five-piece bolt-stop. These parts are: bolt-stop with its serrated thumbpiece, ejector arm pivoted to the bolt-stop on a pin and bolt-stop/ejector spring, which is held against the receiver by a screw. This bolt-stop is almost the same as that used on the FN Browning turnbolt rifle action.

action I have also has a bolt without these lips. I can only conclude, therefore, that the J9 action has a bolt and a receiver that are copies of the M24 Yugoslavian action. Not having had a chance to examine and measure the SSM2 and SSM3 J9 actions, I can only assume that they have a longer magazine to handle 30-06 length cartridges, or are made on the longer regular M98 action and also fitted with a 30-06 length magazine.

The J9 action I received has a number of faults. The bridge was so poorly machined

that it would be very difficult to attach a scope mount base on it level with the front mount base. The top left side of the bridge is not machined down far enough, and the machining that was done is not at all accurate. Such poor and inadequate work is inexcusable.

The surfaces that were polished, which include almost all outside surfaces, were carefully done on a soft polishing wheel, leaving the edges rounded and holes dished out. Despite this heavy buffing after initial rough polishing, tool and polishing marks are still

present under the high sheen. Parts which should have been left together during the polishing, such as the bolt-stop spring in the bolt-stop, were polished separately, and all their edges were rounded off. The bolt-stop spring also appears to have been bent, and then partially straightened again.

The extractor collar is clamped so tightly around the bolt that the bolt handle can only be raised and lowered with considerable effort. There is a flaw in the metal underneath the base of the bolt handle—a flaw that makes it appear as though the bolt handle was welded onto the bolt.

I view this with suspicion. The trigger is so tight in the sear, and the sear so tight on the receiver, that when the trigger is pulled back it stays there. Certainly, some of these faults can be corrected by the amateur gunsmith, but they should not have been present in the first place. It is the poorest commercial centerfire turnbolt action I have seen. Perhaps not all J9 actions are so poorly made as the one I got, but in making my evaluation of this one, I could never recommend this action.

I have no idea of how many of these varied J9 actions were sold by Herter's before these actions were discontinued or before Herter's went out of business. Because they were priced quite low and because the Herter's catalog praised them to the sky, there must have been quite a few. Some readers of this book will probably have one, and I can tell you no more about them than what I have told here.

4. Ackley Mauser

In about the mid-1960s, P.O. Ackley announced that M98 actions bearing his name would soon be available. The late Mr. Ackley, one of America's leading gunsmiths, had a very high regard for the M98 action design. He had arranged for a firm in Japan to make his actions, a very close copy of the latest FN Mauser. The most interesting part of the announcement was that a true left-hand Mauser action was to be made, as well as the normal right-hand type. To the best of my knowledge, this was to be the first true commercial left-hand M98 action ever made.

As so frequently happens, good things often fail to last, and such was the case with Ackley's Japanese-made actions. To prepare a story on these actions I got two of them for

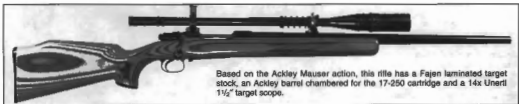


Ackley Mauser action, as made in Japan.

study, but I also phoned Ackley for additional information. I learned, sadly, that only some 150 of them had been made, 50 of them left-hand ones, before the Japanese firm making

them went bankrupt! That was also the end of the Ackley Mauser.

Anyway, since I had two of his right-hand actions (I never had the opportunity to exam-



Based on the Ackley Mauser action, this rifle has a Fajen laminated target stock, an Ackley barrel chambered for the 17-250 cartridge and a 14x Unertl 1 1/2" target scope.

PART II: Commercial Rifles & Actions

ine the left-hand version), I'll briefly describe them. First off, they are marked, on the left receiver wall:

P.O. ACKLEY
SALT LAKE CITY, UTAH

The serial number, preceded by No., is stamped on the right side of the receiver ring. The words **MADE IN JAPAN** are stamped on the flat area under the receiver ring. My two actions have four-digit serial numbers.

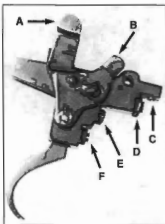
To describe the Ackley Mauser action in detail would be to repeat what has already been written about the FN, Centurion and Santa Barbara actions, but as can be seen in the illustrations, the Ackley differs in minor respects. While the FN has a long, slender, swept-back bolt handle, and the Centurion and Santa Barbara have shorter, heavier handles, the Ackley bolt handle is a close copy of the Model 70 Winchester handle. It has a low profile to clear the lowest mounted scopes, with a stem that is rather heavy and swept back in a double curve, ending in a pear-shaped grasping ball. This bolt handle shape has become immensely popular, most shooters preferring it over any other. I feel the same way.

The Ackley receiver is tapped for the many popular top-mount scope bases and for a receiver sight. Unlike recent FN actions, the Ackley receiver has the near-full inside collar, slotted only for the extractor. The Ackley action has the smooth, shouldered bolt sleeve of the later FN.

The Ackley Mauser action is made entirely of steel. The trigger guard and magazine box are a one-piece steel unit. The floorplate is hinged to the front of the magazine box, the latch positioned just forward of the trigger guard bow. The latch button is quite large, making it easy to unlatch with a finger. On one of my Ackley actions, the guard bow is neatly narrowed. One of the two has a milled steel follower; the other an alloy one. The magazine box opening is 3.355", long enough to accept the standard and belted magnum cartridge of 30-06 length.

The trigger housing is also made of steel. One action has a trigger adjustable only for weight of pull and sear engagement, while the other one is adjustable for over-travel as well. The safety, part of the trigger mechanism, is the pivoting type with a large serrated button alongside the tang. When tipped back, the sear and bolt are locked.

I don't know how the Ackley receivers were made, or of what kind of steel, but they appear to be machined from forgings rather than from an investment or other type of casting. All the parts appear to be well made and finished. The bolt fits snugly in the receiver, and there's a minimum of wobble when the bolt is opened. I tried to put the Ackley bolts in other M98 actions, and the bolts from these actions in the Ackley receiver, but none would interchange. The Ackley bolt body is about .705" in diameter. Both of my Ackley actions were fitted with barrels by Ackley in



Trigger mechanism of the Japanese-made Ackley Mauser action: (A) safety, (B) bolt lock (part of the safety), (C) trigger stop or over-travel adjustment screw, (D) weight of pull adjustment screw, (E) trigger stop, and (F) sear engagement adjustment screw.

17-250 caliber. Both functioned well, although a couple of bugs had to be worked out. There are certainly enough different M98-type actions on the market today, but there is room for another good one, especially a left-handed one.

5. Brevex Magnum Mauser

Made in France and once imported into the United States by Tradewinds, Inc., the Brevex is the only true magnum Mauser action that had been available to American gunsmiths since before WWII.

The first Mauser magnum action was probably developed shortly after 1900, and most likely it was initially developed in the Mauser plant in Oberndorf, Germany. It came about as a result of employing the standard M98 Mauser action for increasingly larger cartridges.

German and British sportsmen were probably responsible for the magnum when, for economy reasons, they wanted bolt-action rifles chambered for large-bore cartridges which, ordinarily, were available only in heavy double-barreled rifles. These large double rifle cartridges were usually rimmed, but for use in a bolt-action rifle, a whole new series of rimless cartridges was designed. Some of the British cartridges for which the magnum Mauser action was used: 404 Rimless Nitro-Express; 416 Rigby; 425 Westley-Richards Magnum; 500 Rimless Jeffery, and 505 Gibbs Rimless Magnum. The

calibers just mentioned also indicate some of the prominent British gunmakers using the M98 magnum Mauser action. Some German cartridges also required the magnum action, but they are not so well known.

Such cartridges not only had large diameter cases and bullets, but some of them were nearly 4" overall. Thus, a longer, larger and stronger action than the standard M98 was needed. The original Mauser magnum action was 9.25" long, made with a very heavy receiver ring, and with a magazine arrangement appropriate to the cartridge to be used.

In many cases, the magazine box extended below the stock line. Other than these features, these magnum actions were essentially the same as the regular M98 action. A few of these Mauser-made magnum actions (they were also made by other firms) were used by some American gunsmiths, but not many of them.

The big swing to custom-made rifles didn't begin until after the end of WWII, and then almost every amateur and professional gunsmith got into the act. The French-made Brevex Magnum Mauser action was intro-



duced into the U.S. in 1955 to meet a demand for such an action.

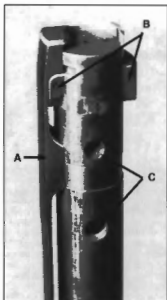
Two Brevox magnum actions were originally introduced; the M300 for such common belted magnum cartridges as the 300 and 375 H&H Magnums, and the M400 for the 416 Rigby and its like. Both actions were the same except for the bolt face recess and extractor. Shortly afterward, barreled actions in 300 H&H Magnum, 375 H&H Magnum and 416 Rigby were made available. The Tradewinds catalog of the late 1960s listed only the M400 at a price of \$160.

Here are the specifications for the M400 Brevox Magnum Mouser action:

Weight	53 oz.
Length	9.25"
Receiver-ring diameter	1.50"
Bolt diameter .....	.700"
Bolt Travel	4.975"
Striker Travel .....	.550"
Magazine Length	3.925"
Magazine-well width .....	.665"
Bolt-face recess.	
(for 416 Rigby cartridge)	
Diameter .....	.590"
Depth .....	.060"
Guard-screw spacing	8.25"
Barrel shank & thread dia.	29x2mm
(1.141" approx. 12.7 V-threads per inch)	

Comparing these figures with those for the M98 military action, it isn't hard to visualize the Brevox as being a very large and massive action. According to the importer, the Brevox receiver and bolt are made of chrome-vanadium steel, heat-treated for maximum strength and durability. The receiver ring is extra thick and large to give maximum support to the bolt and to allow a large-diameter barrel shank to be used. The receiver ring has the regular M98 collar, except that it is slotted on both left and right.

The Brevox bolt, necessarily longer than the standard M98 bolt, is otherwise just like it. It does, however, have a gas vent hole in the left side of the receiver, which regular



Underside view of the Brevox magnum bolt head: (A) extractor, (B) dual-opposed locking lugs, and (C) twin gas-vent holes.

Mauers do not.

The low safety, located in the top of the bolt sleeve, permits low scope mounting, as does the low-profile bolt handle. The receiver ring and bridge are tapped for scope mounts. The trigger is of standard M98 pattern, but has only one hump for a single-stage let-off. Custom single-stage adjustable triggers made for the M98 can be fitted to the Brevox action. A double-set trigger could also be installed.

The trigger guard/magazine assembly is all steel. The milled guard bow is welded to the very thick-walled magazine box. The welding

is well done and doesn't show when the magazine is in the stock. Like the magnum Mouser actions, the Brevox magazine box is quite deep, and this, combined with a heavy and slightly hollowed out floorplate, gives the action a definite belly. The very strong magazine floorplate is hinged to the front of the magazine box, its latch lying in the front of the guard bow.

The Brevox Magnum action I received was well made. The only marking on it was the word **FRANCE** and the serial number stamped on the bottom flat of the receiver ring.

Printed on the box in which this action was packed are the words **Manufactured by BREVEXSURESNES-France**. In bold letters on both sides of the box is printed **Brevox Magnum Action**. The only true full sized, commercial **MAGNUM ACTION** being built in the entire world today. This is no longer true although the Brevox was the only true "Mouser" magnum action made.

At the time I received my Brevox action, the importer told me that these actions were in very limited supply. Since that time, this large action seemed to have disappeared. I imagine, though, that there are still gunsmiths in France who will build magnum rifles on this action.

Seven commercial M98 Mouser-type actions are described and shown. Most of them were available at the time this book was first published (1971). However, to the best of my knowledge, only the Mark X action may be available on a limited basis because political turmoil in the former Yugoslavia has suspended commercial production. The remainder of them are either not being made any more or not being imported into the United States. This is also true for the Parker-Hale turnbolt rifle which was built on a Spanish-made M98 Mouser action similar to the Santa Barbara action. As for the Ackley left-hand Mouser action and the Brevox Mouser, I do not believe we will ever see these actions available again.



Mossberg Model 800

THE FIRM OF O.F. Mossberg & Sons of North Haven, Connecticut, has been in the arms making business since 1919. Most shooters are familiar with the wide variety of low-cost 22 rimfire rifles and bolt-action shotguns they have been turning out for more than a half-century, but few people remember that Mossberg began by making a four-shot pistol. In recent times, Mossberg has branched out to produce some higher priced guns, including an excellent slide-action shotgun and a couple of centerfire rifles.

Their first venture into the centerfire turn-bolt line was the Model 800 announced in 1966. At that time, it listed for just under \$100. Carl H. Benson, an employee of the Mossberg firm, designed the M800 action. Since Mossberg had long produced low- to medium-priced guns, the new centerfire turnbolt action and rifle was designed to enter into the same market. Thus, it was designed to be easily produced with no frills to jack up the price.

The M800 bolt-action repeating rifle was originally made only in the 243 and 308 calibers, two very popular calibers at that time. They still are for that matter. It was made with a 22" sporter-weight barrel that weighed about 6.5 pounds and was fitted with open sights. It had a four-shot non-detachable magazine with a hinged floorplate, and the receiver was drilled and tapped for scope mounts and receiver sights. To the barreled action was fitted a well designed and finished stock, and everything considered, the M800 was well worth the price asked for it.

In 1968, Mossberg began making the M800 fitted with a heavy straight-tapered barrel. They called this rifle the M800 Varmint-Target. It was made in the 22-250 and 243 calibers. The barrel was drilled and tapped to accept target scope bases and a target front sight base. A fuller dimensioned stock was also made for it. About this time, the 22-250 caliber was also added to the M800 sporter line. The barrel on the varmint rifle is 24" long and tapered from 1.125" at the breech to .850" at the muzzle. Weight of this rifle is 9.5 pounds.

The M800 Action

The receiver of the Mossberg M800 is machined from a single piece of chrome-moly

steel. It is threaded up front to accept the flat-ended barrel shank with the separate recoil lug positioned between the barrel and the receiver. The receiver ring is 1.245" in diameter, 1.625" long from the front of the ejection port to the front of the receiver, and the left wall thickness is .235". The reason for the long ring is that a space of around 1.135" is needed into which the locking lug recesses are made. The receiver bridge is the same diameter as the receiver ring. Beneath the receiver ring, there is a flat-bottomed rib about .450" wide and a similar one beneath the tang. Both of these short ribs provide a flat surface of contact with the stock, and it is into these ribs, which appear to be integral with the receiver, that the front and rear guard screws are threaded. In addition, the front rib provides an anchorage for the front of the magazine.

The bolt body appears to be of one-piece construction. At the front of the bolt, six locking lugs are machined into it. There are three rows of them, two in each row, with the front three considerably larger than the rear three. The three rows are not evenly spaced. Only two of them, in the rear circle, are the same size. One of the front lugs has been reduced in width in order to fit the extractor, and one in the rear is almost divided in two by the bolt-stop slot. It is not a neat appearing arrangement.

The face of the bolt is recessed for the cartridge head, with the claw extractor fitted on one side of it and a plunger ejector fitted inside of it. Both the extractor and ejector are activated by small coil springs.

The bolt handle is of unusual shape. It is of low profile to clear a low-mounted scope, but in doing so its shank was made quite thin and oddly shaped. Besides this, the shank is also quite short, and it is swept forward rather than back as are the bolt handles of most bolt-action rifles. Nevertheless, the root of the bolt handle does provide a safety lug by being engaged in a notch in the receiver when the bolt is closed.

The striker is light in weight and made in one piece. The rear end of it is larger than the rest, and this portion is hollow to accept the short but powerful mainspring. If it were not so long, this striker would resemble a striker

in some semi-automatic pistols. On the outside of the rear end is a projection which fits into the cocking cam notch cut into the rear of the bolt body, and on raising the bolt handle the striker is cocked.

The M800 bolt sleeve (Mossberg calls this part the bolt cap) is threaded into the rear of the bolt body. This part is not drilled through and is more like a plug than a cap or sleeve. Anyway, this part serves as the backing for the mainspring, as a gas shield, and as a base to mount the sliding safety. From the threaded plug, the bolt sleeve extends rearward in a gentle angle, and on this surface, and in a slot out into it, is the safety with a large serrated thumb-piece or button. It is made in two parts with a screw connecting the button to an under part which holds the safety in place. A small spring-backed plunger provides ON and OFF tension to it.

To prevent the bolt sleeve from turning when the bolt is open, a lock is provided in the bolt sleeve. This lock is a small spring-backed plunger positioned in a hole in the front of the bolt sleeve to catch into a notch in the rear of the bolt body when the bolt is open. When the bolt is closed, this lock plunger is depressed by the receiver edge, thus allowing the bolt to be operated. This lock is not too unlike the bolt sleeve lock used in the M98 Mauser action, only the M800 lock is not nearly so rugged.

The trigger mechanism consists mainly of a black plastic housing, trigger, sear, and the pins and springs to hold and put tension on these parts. The assembly is held in place under the receiver by a cross-pin at the rear and by a heavy screw through the front of the housing. There are no adjustment screws for the trigger. The sear doubles as the bolt-stop with the underside of the bolt body grooved to slide over it. The sear also serves as a guide to the bolt. The trigger is so made to hold up the sear when the action is cocked, to release the sear when the trigger is pulled back a short distance, to pull the sear out of the path of the bolt when the trigger is pulled further back, and to be blocked by the

(Above) The Mossberg Model 800V Varmint rifle.



The M800 action with bolt and magazine open.

safety when it is slid back to the ON or SAFE position. It is all a simple arrangement suitable for a hunting rifle, although most shooters would have preferred something better. The trigger guard bow is an integral part of the trigger housing, and this is an unusual feature in a high-powered bolt-action rifle.

The barreled action is held in the stock by two screws. The rear one, the smaller of the two, is positioned in a hole about a half-inch behind the trigger housing. The stock is fitted with an escutcheon for the head of this screw, and this escutcheon is threaded so that the screw won't fall out when the rifle is disassembled. The larger front screw, which can be called the front guard screw, is fitted through a threaded hole in the front of the magazine plate so that it won't be lost either. Both screws thread into the rib on the bottom of the receiver. The magazine plate is inletted into the stock and extends rearward to fit into a groove in front of the trigger housing. To this plate, which has an opening in

it the size of the magazine box, is hinged the floorplate. A latch at the rear of the magazine plate allows the floorplate to be opened and locked closed. Both the magazine plate and the floorplate are steel stampings.

Between these plates and the receiver, a very interesting magazine is positioned. It is a box magazine made of steel, and I would class it as a hybrid between a single-column and a staggered-column magazine. I will explain. As mentioned, this magazine box is made of steel—two layers of spring-tempered sheet steel formed and spot-welded into a box. The outer layer has no function except to strengthen the whole unit and to position the box in the magazine opening in the receiver, an opening that has no cartridge guide lips as do most other bolt-action rifles with non-detachable staggered-column magazines. The inner box is the functioning one, and it is the one that has the cartridge guide lips formed in its upper edge. About a half-inch below these lips, both sides

of the inner box are bent inward so that the lips are closer together than the diameter of the cartridge case, making the lips function like those in a normal single-column box magazine. In addition, the follower and the W-shaped follower spring are also of the single-column type, with the follower narrow and flat on top. Thus, on top, the M800 magazine is a single-column type, while below the tapered sides it is a staggered-column type.

When the cartridges are inserted into this magazine, each one is pressed down, spreading the springy sides of the inner box apart. When the next cartridge is pressed into the magazine, the one below it then moves to one side to start the staggered mode. What this magazine does is to position the top cartridge in a central and straight line with the chamber. Besides all this, rounded ridges pressed into the sides of the box at the shoulder location of the cartridges prevent the cartridges from moving forward when the rifle recoils from



Left-side view of the action.

PART II: Commercial Rifles & Actions

firing. The magazine box is also securely affixed to the receiver—at the front by a lip on the magazine fitting into a groove cut into the receiver rib, and at the rear by a longer lip fitted between the trigger housing and the receiver, and tightened in place by the trigger housing screw.

Takedown and Assembly

Open the bolt and make sure the chamber and magazine are empty. Remove the bolt by pulling the trigger back. The bolt can be replaced in the receiver without holding the trigger back, and if the handle is not correctly aligned after the bolt has been inserted, the bolt can be rotated in either direction until the sear engages in the bolt-stop groove.

To disassemble the bolt, proceed as follows: Remove the bolt from receiver. With your fingernail or a small tool, depress the bolt sleeve lock plunger all the way down and turn the bolt sleeve counterclockwise. Since the lock plunger will not pass the striker slot in the bolt without it being held down, it is best to remove it entirely at this point. With the lock plunger removed, unscrew the bolt sleeve from the bolt. Before removing the bolt sleeve, carefully note the position of the lock plunger so that it can be reinserted the same way when the bolt is reassembled. With the bolt sleeve removed, remove the mainspring and the striker. The safety parts can be removed from the bolt sleeve by turning out the screw in the center of the safety button, allowing the safety to come apart. Reassemble in reverse order.

Do not remove the extractor or ejector



The Mossberg M800 action.

unless absolutely necessary. However, if it is necessary to do so, remove the ejector by driving out the small cross-pin that holds it in place. Remove the extractor by using a very small screwdriver to depress the extractor plunger and then lift the extractor out. Reassemble in reverse order.

To separate the stock from the action and barrel, proceed as follows: Turn the rear guard screw until it is loosened from the receiver. If you want this screw all the way out, it must be turned out. Turn out the front guard screw all the way and then turn it back in about two turns. Grasp the guard screw, carefully raise the magazine plate out of the stock and slide it forward to disengage it from the trigger housing. Now the stock can be separated from the barrel and action. Remember that the trigger guard bow is a part of the trigger housing, and it slips out of the stock with the

action. Reassemble in reverse order.

To remove the magazine, turn out the large screw that holds the trigger housing to the receiver and tip the trigger housing back—the magazine can then be worked rearward until its front end separates from the receiver at which time it can be entirely removed. To remove the entire trigger housing and mechanism at this point, slip off the spring clip from the trigger housing pin, remove the pin, and the entire assembly can be removed. Reassemble in reverse order. If you want to disassemble the trigger mechanism just remove the pins and springs, being careful to note their position and not to lose them.

Comments

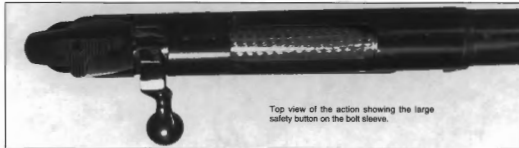
It has been my good fortune to have owned, used and worked on a great many

Dimensional Action Specifications

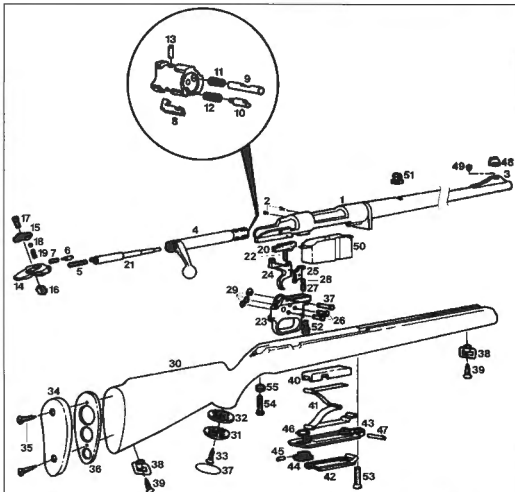
Action length	8.250"
Receiver length	7.875"
Receiver diameter	1.245"
Bolt diameter	.750"
Bolt travel	3.875"
Striker travel	.300"
Magazine length (inside)	2.865"
Front guard screw threads	¼x32
Rear guard screw threads	10x32

General Specifications

Type	Bolt action, box magazine repeater
Receiver	One-piece machined construction, solid bridge, separate recoil lug fitted between barrel and receiver.
Bolt	One-piece rotating bolt, six locking lugs in three rows on front of bolt, root of bolt handle serves as safety lug.
Ignition	One-piece striker, coil mainspring, cocks on uplift of bolt handle.
Safety	Sliding safety on bolt sleeve, locks trigger only.
Bolt-stop	Sear doubles as bolt-stop.
Extractor	Claw type recessed in bolt head.
Ejector	Plunger type in bolt head.
Trigger	Non-adjustable, single-stage, trigger also serves to release bolt-stop.
Magazine	Non-detachable, staggered-column box magazine with hinged floorplate.

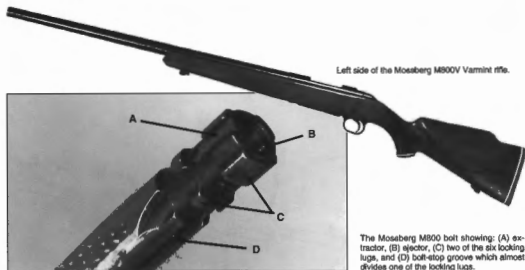


Top view of the action showing the large safety button on the bolt sleeve.



Parts Legend

- | | | |
|--------------------------------|----------------------------|----------------------------------|
| 1 Barrel and Receiver Assembly | 19 Safety Click Spring | 38 Swivel Loop and Bushing |
| 2 Dummy Screws | 20 Sear | 39 Swivel Screws |
| 3 Front Sight Ramp | 21 Firing Pin | 40 Magazine Follower |
| 4 Bolt | 22 Sear and Trigger Spring | 41 Magazine Spring |
| 5 Striker Spring | 23 Trigger Housing | 42 Magazine Floorplate |
| 6 Safety Cap Lock Plunger | 24 Trigger | 43 Magazine Stock Plate |
| 7 Safety Cap Lock Spring | 25 Trigger Sear | 44 Magazine Latch |
| 8 Extractor | 26 Trigger and Sear Pins | 45 Magazine Latch Spring |
| 9 Ejector | 27 Trigger Sear Spring | 46 Magazine Latch Retaining Ring |
| 10 Extractor Plunger | 28 Trigger Sear Plunger | 47 Magazine Floorplate Pin |
| 11 Ejector Spring | 29 Retaining Rings | 48 Front Sight |
| 12 Extractor Spring | 30 Stock | 49 Front Sight Screw |
| 13 Ejector Retaining Pin | 31 Grip Cap | 50 Magazine Shell |
| 14 Safety Cap | 32 Grip Cap Spacer | 51 Rear Sight |
| 15 Safety Button | 33 Grip Cap Screw | 52 Trigger Housing Screw |
| 16 Safety Lock | 34 Buttplate | 53 Front Takedown Screw |
| 17 Safety Button Screw | 35 Buttplate Screw | 54 Rear Takedown Screw |
| 18 Safety Click Ball | 36 Buttplate Spacer | 55 Escutcheon |
| | 37 Housing Pin | |



Left side of the Mossberg M800V Varmint rifle.

The Mossberg M800 bolt showing: (A) extractor, (B) ejector, (C) two of the six locking lugs, and (D) bolt-stop groove which almost divides one of the locking lugs.

centerfire turnbolt rifles. Each one has added to the gun knowledge that I have stored away either in my mind or on paper and film. And when I had chances to repair or alter these rifles, I also gained considerable knowledge of the rifle, thus noting whatever weaknesses and faults it had. I also listen to the owner tell of his experiences with that particular rifle. If there are several rifle shooters in my area who use the same make and model rifle, just listening to them can tell me a lot about that rifle. The point is that until just recently I knew of no one in my entire area who owned a Mossberg M800, nor did I ever see one in any sporting goods or hardware store, or at any of the many gun shows I attended in the 75-mile radius of my home. That means that I have to base the following comments on what I learned from examining just one M800—the M800 Varmint-Target rifle pictured here. Oh, yes, I've read a number of test and evaluation reports on this rifle in various gun magazines when the rifle was first introduced, but that was not the nit-picky information that I was looking for.

With no Mossberg M800 rifles for me to learn from, I was not sure what its faults and weaknesses were. However, by following the history of this rifle, it is apparent that it did have them. This is not to fault its designer because he had to design it with low-cost production in mind. One reason I believe this rifle had several weak points is that only a short time passed before Mossberg introduced the Model 810, a rifle of the same general appearance as the M800, but with a

number of major changes in the action. Another reason is that Mossberg discontinued manufacturing the M800, as well as the M810 and RM7 models, after only a few years.

No matter, there are features about this action that I like and others that I dislike. I think the magazine design is good, at least it certainly looks fine to me. I also like the design of the striker, mainspring and the bolt sleeve, although I would much rather see it shortened at least $1/2$ ". The safety is ok, but I would rather have it attached to the receiver tang, then reshaping the bolt sleeve into a knurled threaded plug. I'd rig the safety to also lock the bolt. I'd also like to see at least one gas vent hole near the front of the bolt. I do not think it is a good idea to make the trigger housing from plastic, especially not for a big game hunting rifle. On a bolt-action centerfire rifle, I do not like to have the sear also serve as the bolt-stop. The irregular pattern of the locking lugs on the M800 bolt turns me off. The bolt handle is an odd thing, too.

Otherwise, the M800 that I obtained functions well. The magazine is easy to load and cartridges feed from it smoothly. A bit more camming movement could have been provided on closing the bolt, although it is sufficient on opening the bolt. I had no problem operating the bolt. The trigger pull was just under 4 pounds and that suited me. The safety functioned as it should, and it was silent.

Earlier I mentioned the Mossberg Models 810 and RM7. The actions of these two rifles are spin-offs from the M800, but yet so different in design that I cannot include them as part of

this chapter. They will have to wait for another time.

In addition to the M800 standard sporter and the M800 Varmint-Target rifle, Mossberg also briefly produced two more models on the same action. They were the M800 Carbine with 20" barrel and a full-length Mauser-style stock in calibers 22-250, 243 and 308, plus the M800 Deluxe sporter with 24" barrel and a stock dressed up with a rosewood forend tip and grip cap in calibers 22-250, 243 and 308. These two rifles were only made a short time between 1969 and 1972. For a short time, the standard sporter, Varmint-Target and the Deluxe M800 models were also made in the 222-caliber. All were discontinued in 1972.

The Mossberg Model 800 was, from the start, faced with some stiff competition from the Remington Model 788. In almost every way, the Model 788 was a better rifle than the Mossberg M800 in design, construction, and performance—it is no wonder then that the M800 was discontinued. The other two Mossberg centerfire bolt-action rifles that followed it, namely the 810 and the RM7, had no chance either.

Markings

The Mossberg M800 rifle that I examined is marked as follows:

On top of the barrel is stamped:

MOSSBERG
MADE IN U.S.A.
NORTH HAVEN, CONN.

The serial number is stamped on the left side of the receiver ring.



Newton Original Turnbolt

AN ENTIRE BOOK could be written about Charles Newton and his adult lifetime interest in designing, developing and producing new cartridges and rifles. Perhaps someone has done it. Much has been written about his cartridges, but we really do not know much about the two turnbolt rifles he designed and produced, and even less about the man himself and the details of his efforts to get his designs manufactured. It is a story yet to be told about a man far ahead of his time in the cartridges he designed, and of his few successes and of his many failures. In this chapter, I am going to limit my discussion strictly to the first firearms action that he designed and manufactured, an action that is now known as the Original Newton action.

Before describing the Original Newton action, a brief introduction is needed. Charles Newton first became interested in high-velocity rifle cartridges, and his work along this line led him to develop the 22 Savage Hi-Power and the 250-3000 cartridges which the Savage Arms Company adopted and made famous. Newton then went on to design and develop much more powerful cartridges, the two principal ones being the 256 Newton and the 30 Newton. This all took place prior to 1914. He evidently was not satisfied with the commercial and military turnbolt actions being made at that time—the result was that he designed his own action, one that was strong and safe enough to handle his newly designed high-powered cartridges. Thus was born the Newton turnbolt action. This done, Newton then organized and established a company to make the actions, and rifles built on them, and issued a catalog to open a market for them. This was in 1914. The firm was named The Newton Arms Company, and it was established in Newton's home town of Buffalo, N.Y.

The Newton Action

Charles Newton's original action was a well thought out and designed turnbolt with a staggered-column box magazine. It was built especially to handle the powerful rimless bottlenecked cartridges that he had designed and

was promoting. The action featured a one-piece bolt with interrupted lockings lugs on the front of it, a bolt handle and safety that needed no alterations for a low-mounted scope on the rifle, double-set triggers, a hinged floorplate and a clever takedown system.

Other than the Mauser-type extractor, Newton's action had very little mechanically in common with any of the existing turnbolt actions of that period, the chief ones at that time being the Mauser M98, Springfield M1903, and the P17 Enfield. As we shall see, it was not an action that was easily made. I can imagine that the greater part of the manufacturing plant, most of the machinery in it, and most of the labor and mental effort were given over to producing the action as compared to the making of the barrels and stocks. The action was the heart of the Newton rifle, and I can imagine that its inventor wanted it made right.

The receiver of the Newton action is not too unlike that of the Model 98 Mauser. It seems to have been machined from a one-piece forging and is flat-bottomed except for a short section at the front of the receiver ring. There is a heavy recoil lug under the receiver ring. Both the right and left receiver walls are substantial, much as with the Model 70 Winchester action. The receiver ring is $1\frac{1}{2}$ " long, and the receiver bridge $1\frac{1}{16}$ ". The front of the receiver ring is threaded with square-type threads to accept the barrel shank. There is no barrel abutment ring inside the receiver ring as in the M98 Mauser receiver, rather the breech end of the barrel is coned. The extractor cut in the barrel breech extends clear across its face rather than just on the right side where the extractor is positioned, with a gas escape hole in the left receiver wall in line with it.

The Bolt

The bolt is of one-piece machined construction, probably made from a forging. Up front, it has a dual set of opposed locking lugs; four narrow lugs on the left which engage in a matching set of shoulders in the top of the receiver ring, and three similar lugs on the right which engage in shoulders in the bottom of the receiver. Each set of lugs pro-

ject beyond the bolt body, and this requires that raceways be made in the receiver for the bolt to move rearward and forward.

The extractor is of the standard one-piece Mauser type that does not rotate as the bolt is opened and closed, and it is held in place on the bolt by a collar. A lip just to the rear of the hook engages in a groove in the edge of the bolt head. The reason why there are only three locking lugs on the right side is to make room for this lip.

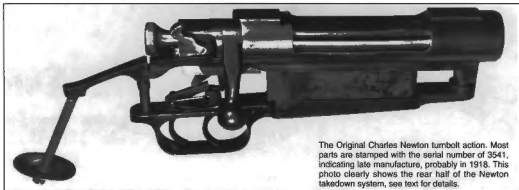
The bolt has the usual Mauser recessed face, with part of the rim of the recess cut away. As the bolt feeds a cartridge from the magazine, the head of the cartridge rises directly into the recess and becomes engaged with the extractor hook at the same time. Today this is called controlled feeding. This feature prevents double loading, which means that the bolt cannot feed another cartridge from the magazine unless it has gotten rid of the previous one. This is a mighty good feature on a hunting rifle.

Charles Newton provided the bolt of this action with dual-opposed safety lugs. These lugs are rather small, but they do provide an adequate measure of safety should the front locking lugs or the receiver ring fail for some reason. These safety lugs are located about an inch forward of the bolt handle collar and are in line with the regular locking lugs. Each of these lugs are only about .060" in height above the bolt body and engage the upper and lower front edges of the receiver bridge when the action is closed.

A square-edged collar surrounds the rear end of the bolt with the bolt handle made as an integral part of it. The rear end of the receiver bridge is recessed for the entrance of this collar, and this affords a good seal around the bolt, all except for the left locking lug raceway. Here, Mr. Newton would have been wise to have provided a flange on the left side of the bolt sleeve to close off the entire raceway. The bolt

(Above) An original Newton rifle except that the open sights have been removed from the barrel. This rifle bears serial No. 3541 and is chambered for the 256 Newton cartridge.

PART II: Commercial Rifles & Actions



The Original Charles Newton turnbolt action. Most parts are stamped with the serial number of 3541, indicating late manufacture, probably in 1918. This photo clearly shows the rear half of the Newton takedown system, see text for details.

handle has a very low profile, although I doubt very much if Newton had low scope mounting in mind when he designed it. The root of the bolt handle and the notch for it in the receiver also serve as an additional safety lug. Initial extraction camming power is provided when the bolt is opened by the root of the bolt handle coming into contact with an angled surface on the rear of the receiver bridge.

The overall design of the striker mechanism is good. The striker, or firing pin if you wish to call it that, is of simple one-piece construction. It has a collar near its front end to retain the mainspring, and it is threaded into the rear end for a nut. The bolt sleeve is threaded into the rear of the bolt body with left-hand threads. There is the usual cocking cam which fits partly inside the bolt sleeve and over the rear of the striker and the assembly; that is, the striker, mainspring, bolt sleeve and cocking cam are held together by the threaded nut on the rear of the striker. Provisions are provided to keep the striker from turning in the cocking cam and the nut from turning on the striker. Inside the bolt sleeve, there is a spring-backed plunger that engages the collar on the bolt, and it

serves as the bolt sleeve lock, although not as a positive lock. The safety and the bolt lock are combined, and these parts are also cleverly built into the bolt sleeve. When engaged in the ON or SAFE position, the safety locks the cocking cam and striker while at the same time the bolt is also locked and cannot be opened. The safety is a bit on the small side to operate easily into the SAFE position, but otherwise it is placed right for scope use and is convenient to put quickly into FIRE position.

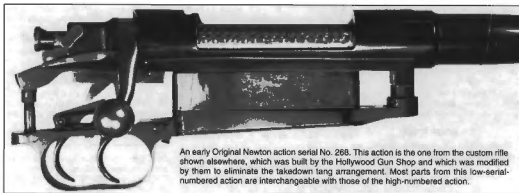
All in all, this Newton striker and safety system is lighter, faster, neater, handier and better than that of either the Model 98 Mauser or Model 1903 Springfield. It is not difficult to disassemble either, and no tools are required to do it.

No gas escape holes are provided in the bolt. If ever a cartridge case should rupture due to excessive breech pressures, the failure will probably occur where the rim is unsupported at the undercut of the bolt face. When the action is closed and the bolt locked, this undercut area is facing to the left and toward the locking lug raceway and the vent hole in the receiver at that point.

The Original Newton action is fitted with an excellent double-set trigger mechanism. The sear

is pivoted on a pin in a groove in the bottom of the receiver bridge and tang, and a projection on it projects upward through a hole to engage with the cocking cam. The sear is fitted with two short levers. The one in front serves as the let-off for the front trigger to fire the rifle in the normal way or without employing the set trigger mechanism. The rear lever is the knock-off for the rear trigger to strike when the set trigger mechanism is used to fire the rifle. The set trigger mechanism itself is mounted in the trigger guard bow. Except that the mechanism is of rather unusual design, it is typical of the common European double-set mechanisms used in Mauser sporting rifles and functions in the same way.

The bolt-stop and the ejector are mounted on a cross-pin in the bottom center of the receiver bridge in the same slot with the sear. They are provided tension by a small coil spring that also provides tension to the sear. The bolt is stopped on its rearward travel when the stop moves into a deep notch near the front of the bolt. At the same time, the ejector part of the bolt-stop slides upward into a narrow slot cut into the bolt face to eject the cartridge or case being extracted. The bolt-stop is linked to the front



An early Original Newton action serial No. 268. This action is the one from the custom rifle shown elsewhere, which was built by the Hollywood Gun Shop and which was modified by them to eliminate the takedown tang arrangement. Most parts from this low-serial-numbered action are interchangeable with those of the high-numbered action.



The Original Newton action, open.

lever in the sear so that, on pulling the front trigger back as far as it will go, the bolt-stop is swung down to allow removal of the bolt.

The trigger guard bow is an integral part of the trigger guard/magazine plate with the plate forming the bottom part of the magazine box. In the front of this plate, there is a female threaded lug that is held in place by a pin, yet allowing the lug to revolve. The lower end of this lug is slotted, and here the floorplate is hinged with a pin. A plunger catch, similar to that used by Winchester in their Model 70 rifle, built into the front of the trigger guard bow serves as the floorplate catch. A double-threaded stud about $1/2$ " long and $1/4$ " in diameter, threaded 32 T.P.I. at one end and 24 T.P.I. at the other, is threaded into the recoil lug of the receiver, the hole having the finer thread. By opening the floorplate, it is used as the wrench or lever to turn the lug in the trigger guard plate—to turn it off or on the threaded stud. This combination thus becomes the front guard screw to hold the barrel and receiver assembly in the stock, and the front half of a very good takedown system to allow the barrel and receiver to be quickly dismounted from the stock. The threaded stud with two pitches is slotted for a screwdriver at the coarse thread end, and this allows it to be adjusted so that the lug is turned up tight when the floorplate is in correct alignment for closing. A small set-screw threaded in the side of the recoil lug prevents the stud from turning.

The other half of the Newton takedown system is more complex and is at the rear of the action. It centers on a part that is inletted into the top of the grip of the stock, a part which I will call the takedown tang. It is securely held in place by two screws: at the rear by a long screw that passes through the steel pistol grip cap and pistol grip, and at the front by the rear guard screw that passes through the rear of the trigger guard and stock to thread into an integral lug in the tang. A lip on the end of the receiver tang engages under a matching lip on the front of the takedown tang when the barrel and receiver assembly are in the stock, effectively anchoring the rear of the action in place and (when the trigger guard plate lug is unscrewed from the front guard screw stud) allowing the barrel to be tipped up and removed from the stock. The front end of the takedown tang is slotted and fitted with a draw screw so that an adjustment can be made to obtain and maintain a tight fit of the rear of the receiver in the stock. The rear guard screw holds the trigger guard plate in the stock when the rifle is taken down. The Newton stock is made with a rather slim pistol grip, but it is reinforced by the long screw that passes through it, as well as by the tang and rear guard screw.

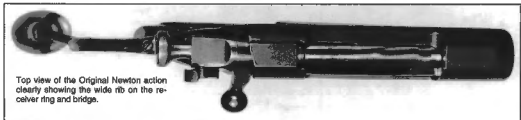
On the two original rifles that I have, there is a U-shaped magazine box liner or shield made of thin steel that fits between the receiver and the trigger guard plate. If the receiver and the trigger guard plate were properly inletted into

the stock, this liner would not be needed as the stock wood could serve as the magazine walls. Also, these actions have stamped-steel magazine followers which appear to be original, and the floorplates are not provided with any means to anchor the follower spring to them. The lack of this last provision could easily result in the loss of the follower and spring.

Takedown and Assembly

To disassemble the Original Newton bolt, proceed as follows: Remove the extractor by lifting its front end away from the bolt until the retainer lip is free of its recess, and then slide it forward. Do not remove the extractor collar unless absolutely necessary, as that may spring it out of round. Remove the striker and bolt sleeve assembly by grasping the bolt body in one hand and turning the bolt sleeve with the other, turning it clockwise as the threads on it are left-hand. It takes about three and a half turns.

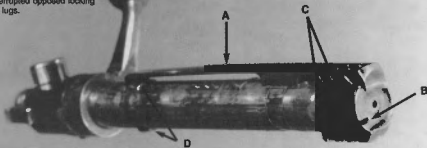
The striker head will fall into the cocking cam notch on each turn, but this is ok as the bolt sleeve can be easily turned on past. With the striker assembly removed from the bolt, place the firing pin tip on a hard surface, grasp the bolt sleeve firmly and depress it enough so that the safety can be engaged. Repeat this last step, but this time unscrew the striker nut (it has a right-hand thread). With this nut removed, slowly let up pressure on the bolt sleeve until the mainspring is relaxed. The main striker parts can now be disassembled. To disassemble



Top view of the Original Newton action clearly showing the wide rib on the receiver ring and bridge.

PART II: Commercial Rifles & Actions

The Original Newton bolt showing: (A) extractor; (B) bolt face recess and ejector slot; (C) interrupted opposed locking lugs; (D) safety lugs.



the safety and bolt sleeve plunger parts, rotate the safety so that its wing is about a 45-degree angle upward to the rear—at or near this position it can be pulled to the right and out of the bolt sleeve. When doing this, be sure to hold your thumb over the small holes in the rear of the bolt sleeve to prevent the loss of the small plungers and springs that are in those holes.

To reassemble the bolt, follow the reverse order. A small drift punch can be used to depress the bolt lock and bolt sleeve plungers when reinserting the safety. With the safety in the OFF position, grasp the bolt sleeve firmly, place the striker with its firing pin tip on a hard surface with the mainspring in place, slip the bolt sleeve in the striker, depress the mainspring with the bolt sleeve, slip the cocking cam in place and rotate the striker as needed to allow the cocking cam to slip into place, and then screw on the striker nut a couple of turns. Next engage the safety to the ON position and then turn on the striker nut, leaving it flush with the rear end of the striker and engaged with the cocking cam. Now insert the assembled striker into the bolt and the bolt

sleeve into place, turning it counterclockwise. On the last turn, disengage the safety so that the bolt sleeve can be turned home. Then back it up to the cocked position.

Markings

The Original Newton rifles are marked with the name and address of the Newton firm and are serial numbered. The markings are usually as follows. On top of the barrel is stamped:

NEWTON ARMS CO. INC.
BUFFALO, N.Y.
.256 NEWTON (or other cal.)

On top of the breech end of the barrel is stamped:

PATENTS PENDING

Most of the parts of Newton rifles are stamped with the serial number; the same number being put on the bottom of the receiver ring, under the bolt handle, trigger guard, tang, pistol grip cap, stock, etc.

Incidentally, to the best of my knowledge, the Newton action was never patented.

Variations

In the short time that the Original Newton rifle was made, its action underwent several changes. It is not known at what serial number these changes occurred, but Newton rifle collectors separate the change occurrence by describing or referring to the actions as early- or low-numbered rifles and late- or high-numbered rifles. Perhaps the change occurred when Charles Newton lost control of the factory. Anyway, the photos of the two actions show some of the changes that were made. The changes may not have been adopted all at once, and they may not have been consistent. At some point, however, the cocking knob was changed, and so was the safety and the bolt handle. The right rail of the receiver was strengthened on the late-manufactured ones. The markings probably were changed also. Undoubtedly, other changes occurred such as in the stock and fittings.

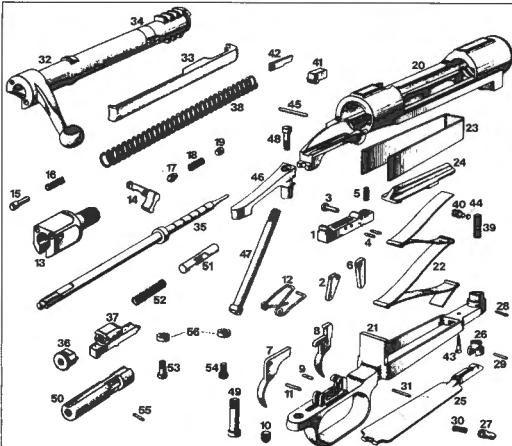
Variations also exist because Newton rifles were offered with special-order extras. This included barrels of various lengths, different front sight and a cocking knob aperture sight, engraving and special wood. Then, too, many of the Newton rifles that still exist today have been gunsmithed and altered in some way, and sometimes it takes a knowledgeable Newton rifle collector to spot these rifles. All in all, of the 4000 Original Newton rifles that were turned out and sold, I doubt that very few are around today that are 100-percent factory original.

Comments

Newton rifles are very scarce. I have never owned one or ever fired one. In fact, I have never seen more than four or five of them in all my life. The only two original Newton rifles that I have closely examined are the ones shown here which belong to my son.



The threaded barrel shank of a Newton barrel. It is almost identical to that of the M1903 U.S. Springfield.

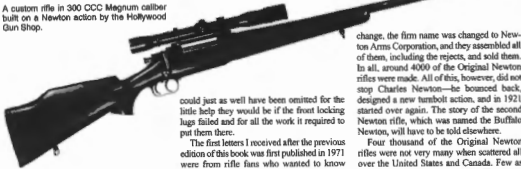


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PART II: Commercial Rifles & Actions

A custom rifle in 300 CCC Magnum caliber built on a Newton action by the Hollywood Gun Shop.



Therefore, my comments on the action are based on what I saw in these two examples.

My overall opinion of this action is that it is a good one and that Newton designed it well. I like the Mauser-type extractor and the undercut bolt face recess as these features eliminate the double-loading problem. I like the interrupted locking lug system and the large amount of locking area they provide to lock the bolt in the receiver. I also like the rather long receiver bridge, the bolt sleeve, safety mechanism, firing mechanism and the arrangement of the hinged floorplate. I especially like the quality of the set trigger mechanism. It was farsighted of Newton to make the bolt handle and safety the way he did so that a scope could be mounted low on the receiver without altering anything. I also like the looks of the rib on the receiver ring and bridge.

There are several features of the Original Newton action that I do not like or much care for. The bolt handle is too short and stubby for making fast repeat shots. The safety button is a bit on the small side for quick manipulation. The trigger guard bow is too big and heavy to be graceful, although on a hunting rifle it is better to have it this way than too small and thin. The puny twin safety lugs on the bolt

could just as well have been omitted for the little help they would be if the front locking lugs failed and for all the work it required to put them there.

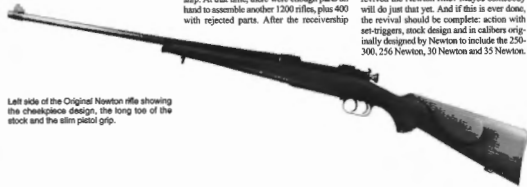
The first letters I received after the previous edition of this book was first published in 1971 were from rifle fans who wanted to know why I had not included Newton rifles in it. Those who know the Newton rifles thought I had left out the finest turnbolt rifle of all. How could I have overlooked them? There was no other rifle quite like it, they all said. Well, the truth is that at that time I knew nothing firsthand about the Newton rifle, and so I could not write about it then. Secondly, the publisher said "whoa" when he received my manuscript. "It's enough for a book." He told me to save any extra material I might have or assemble later on for an enlarged edition and that is what I did.

The May, 1971, issue of *American Rifleman* carried a fine article by M.D. Waite on the Newton rifles and cartridges. In it some interesting statistics are given. For example, the following dates and figures are given as related to the Original Newton rifle: The Newton Arms Company was established in 1914 to manufacture the Newton rifle. Production started in 1917. The Newton Arms Company was organized in 1914, and it took a year to get the plant equipped and operating. But it was not until early in 1918 that the first all-Newton—that is, a Newton rifle with Newton action—was shipped out of the plant. By April of 1918, 2400 Newton rifles had been made, but by then the firm went into receivership. At that time, there were enough parts on hand to assemble another 1200 rifles, plus 400 with rejected parts. After the receivership

change, the firm name was changed to Newton Arms Corporation, and they assembled all of them, including the rejects, and sold them. In all, around 4000 of the Original Newton rifles were made. All of this, however, did not stop Charles Newton—he bounced back, designed a new turnbolt action, and in 1921 started over again. The story of the second Newton rifle, which was named the Buffalo Newton, will have to be told elsewhere.

Four thousand of the Original Newton rifles were not very many when scattered all over the United States and Canada. Few as they were, they were good rifles. They were stocked and barreled in the typical German sporting pattern. Most were chambered for the 236 and 30 Newton cartridges, as these two were the most popular Newton-designed calibers. Some of the 4000 rifles may have been chambered for some of the other cartridges that Newton developed, such as the 280 Newton, 33 Newton, 35 Newton and the 400 Newton. Not only are the original Newton rifles rare, but so are the genuine Newton cartridges loaded in the Newton plant.

Charles Newton died in 1934. Hardly anyone who has examined and studied the Newton multi-lug action questions that it is of superior design. By the expenditure of what must have been an untold amount of energy, time, money and perhaps worry, Newton had designed and put together an outstanding high-powered sporting rifle, and gotten together men and machinery to manufacture it. What a great disappointment it must have been to him to see the entire venture fail and the remains taken over by others. We can be certain that it was no fault of the rifle that the project failed. The venture might have ended in success had Newton waited until after the war to begin manufacturing it. Anyway, my question now is why has not somebody revived the Newton rifle? Maybe somebody will do just that yet. And if this is ever done, the revival should be complete: action with set-triggers, stock design and in calibers originally designed by Newton to include the 250-300, 256 Newton, 30 Newton and 35 Newton.



Left side of the Original Newton rifle showing the cheekpiece design, the long toe of the stock and the slim pistol grip.



Omega III

READING THIS BOOK is like looking through a kaleidoscope, slowly turning the pages and viewing a never ending array of bolt-action rifle designs. I like to think that Paul Mauser started it all back in 1871 when he designed the Model 1871 rifle. I like to think of him as the father of the turnbolt rifle because in the many years since that time many manufacturers of rifles have used, and still are using, some of his basic designs. A great many arms designers and makers have followed in his footsteps. Many of their names are mentioned in this book. Persons interested in the turnbolt mechanism wonder when this inventing time will end. He may wonder, too, if there is still anything new under the sun. But I wonder if new bolt-action designs will ever cease. Homer Koon, who designed the Omega, perhaps thought that his action described here would be the last word in gun designs, hence the name Omega which in Greek means last. So, are you looking for something different? If so, then read on because there are some new features in the action I am about to describe.

"Have you ever seen an Omega rifle?" the voice on my telephone asked.

"No," I answered.

"Would you like to see one?" By now I was downright curious.

"Sure would."

"Then I'll send you one."

Then he introduced himself. He was Randall Bauman from Minnesota. He told me that he had not long before purchased an Omega rifle at an estate sale. He couldn't resist it, he said. After taking the rifle home he sought information on it. He hunted through my bolt-action rifle book and could not even find the Omega name mentioned. Next he looked through many *Gun Digests* and found dope on the Omega rifle in the 1972 and 1973 issues. He found what he was looking for—data on the strange rifle he had just bought. These short pieces were written by John Amber and Larry S. Sterett.

The Omega rifle accompanied by the two *Gun Digest* pieces arrived at my home in short order. I wasted no time in examining the rifle and reading the *GD* pieces. One article indicated that this rifle was introduced in about 1971.

After I had taken a good look at the Omega rifle I recalled seeing one years back on my television screen. I do not recall just what the occasion was for the large gathering of people in that room, but there was that good looking gentleman John Connally, right in the center of the goings on. Perhaps it was because he had won an election or was named to a cabinet post. Anyway, with much ado he was presented a very fancy engraved and stocked Omega rifle. It shown brightly under the lights. The rifle and the man got a lot of exposure and I suppose more than a million people saw them as I did. Then a few years later I again saw Connally and the rifle on the TV screen, but this time it was no celebration. Instead, he was being interviewed prior to his bankruptcy auction sale when he showed his Omega rifle and told us that it, too, would be on the auction block.

The title of one article in the *Gun Digest* was "Firearm Development, Inc." I assumed therefore that the rifles were made by this firm. The article also stated that Homer E. Koon, Jr., designed it. He also designed the Texas Magnum action described elsewhere in this book. I have no further information on this firm or on Mr. Koon. There was no address and no date when the last Omega rifle was made. The rifle I have is marked as follows: On the left side of the receiver is:

OMEGA III
BY H KOON

On the right side of the receiver is the serial number 592. On the left side of the barrel breech the caliber is stamped.

The Omega rifle I had is chambered for the 300 Winchester Magnum, so stamped on the barrel breech. The round tapered sporter barrel is 24" long. The barrel has no sights and no provision to accept any. The stock and forend

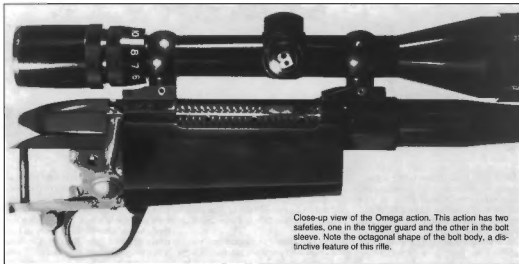
are laminated with dark and light layers of what appears to be walnut and maple. Both are finished with a hard coating of a resin or plastic material smoothly applied and originally polished to a high luster. Neither are checkered and I found that unusual on such an otherwise quality gun. The forend is fitted with an angled piece of rosewood on its end, and attached to the barrel by the front sling swivel stud, which in turn threads into a lug attached to the barrel. With scope and mounts it weighs 9.5 pounds.

The buttstock is fitted with a ventilated recoil pad. It appears that the pad was original, and to my surprise was still resilient. It has a raised comb and cheekpiece and has an engraved sterling silver pistol grip cap.

The unusual thing about the buttstock is the way it is fitted and attached to the receiver. When I removed the rifle from the box the butt was very loosely attached. I thought this odd. I figured that the stock was attached by a through-bolt but found no evidence that the recoil pad had ever been removed. I thought this was also unusual. I then took time to read the letter sent with the rifle, and found out that there was no through-bolt. Instead, there was a single tang screw and Bauman had purposely loosened it for shipment. Curious, I removed this screw and the stock and found that the trigger guard formed a short lower tang, the rear end of the receiver served as an upper tang, and that the stock had been perfectly inletted and fitted to the action. It also was tenoned into the hollow rear of the receiver so that on tightening the tang screws the stock was securely attached. Regardless of what I thought about such an arrangement it must have proved satisfactory.

Bauman also stated in his letter that before shooting this rifle he tightened the tang

(Above) The Omega III Rifle. It has a laminated walnut and maple buttstock and forend. Weight is 9.5 pounds with Bushnell Sportview scope in Conestog mounts.



Close-up view of the Omega action. This action has two safeties, one in the trigger guard and the other in the bolt sleeve. Note the octagonal shape of the bolt body, a distinctive feature of this rifle.

screw and afterward loosened it again. This, he said, kept the wood from being squeezed or otherwise shrunk if the tang screw was always kept tight. The forend is tenoned into the front hollow of the receiver. Anyway, this stock fastening arrangement was adequate but I wonder why Koon chose not to use the through-bolt system.

All the same, the forend is well shaped and proportioned for a rifle of this weight and caliber. I cannot say this about the buttstock, because for a rifle that produces considerable recoil the pistol grip is too close to the action, trigger guard and safety on the rear of the bolt sleeve. Although I have not fired this rifle, I am sure that on my first shot the trigger guard would jam against my middle finger and perhaps bruise or cut it.

The Omega III Action

The distinct part of the Omega rifle is its action which requires a two-piece stock. To begin, it is long, thick and heavy with a large amount of exposed metal. If all that exposed receiver metal is to be engraved it would require quite an outlay of money. The action is 9.250" long, and the receiver proper, that is the metal between the forend and the butt, is 5.12" in length. It is also 1.250" thick. It is an all-steel receiver, and although it is hollowed out for the rotary magazine and bolt, it is still heavy.

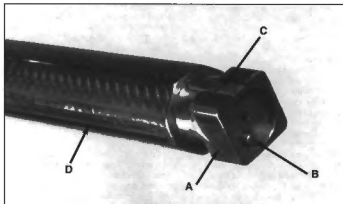
The Omega receiver is of two-piece construction with the bottom made as a separate piece. This piece extends the full length of the action and the fit of it to the receiver proper so close as to be difficult to detect. This piece is attached to the main part by a screw at its

front; I am not sure how it is fastened at the rear. The trigger guard is a close mortised fit into this bottom part. On close examination the two main parts appear to be investment castings.

The receiver is bored clear through for the bolt, it is machined to accept the threaded barrel shank, a loading/ejection port, magazine well opening, and the rear end is fashioned into an upper tang of sorts. In addition, this top part of the receiver is machined underneath and half hollowed out for the rotary magazine spool. The bottom half is also hollowed out for the magazine spool, and machined to accept the trigger guard. Metal is

removed from the bottom to leave either an octagonal or rounded shape.

The Omega bolt is impressive. Although the bolt handle may have been welded on, the bolt can be considered to be of one-piece construction. Two features of this bolt make it different from all other makes and models of bolt-action rifles which I have seen or know about, and they are the shape of the bolt body and the even more unusual bolt head. The bolt body is of octagonal shape with slightly rounded edges where two flats meet, and it is these edges which contact only the inside of the receiver. Koon could have left the bolt body round and cut grooves in it like Weath-



This view of the front of the Omega bolt shows: (A) square bolt head, (B) ejector, (C) extractor and (D) bolt-stop groove.



Left side of the Omega action. The tang screw alone secures the buttstock to the action.

erby does to reduce friction, but he chose the octagonal shape to achieve the absolute minimum of friction between bolt and receiver.

The octagonal bolt is different and unusual, but the locking lugs are even more so. This was done by making the front end of the bolt square, making the area behind the square section round to a diameter the same as the width of the square, and the four corners of the square become the locking lugs. The square bolt face is .670" wide, making the area .449 square inches; the round section behind the square is .675" in diameter with an area of .358 square inches. Subtracting this area from the square area leaves .091

square inches, or a total of that much minus some machining tolerances as the locking lug area. The locking lug area of the Winchester M70 bolt is approximately .208 square inches. While the Omega locking lugs appear to be sufficient to lock and hold the firing of the belted magnum cartridges, I believe I would rather have a more conventional lug system.

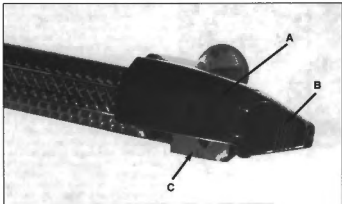
The extractor is of the claw type mounted in the bolt head and is pivoted on a pin and tensioned by a small spring. The claw of the extractor is flush with the face of the bolt which, when the bolt is closed, fits very close to the flat face of the barrel. The ejector

is to one side of the cartridge head recess and it is of the common spring-back plunger type.

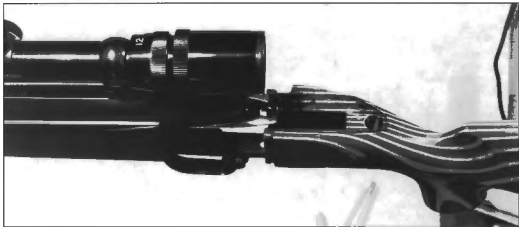
Because the bolt head has four locking surfaces or locking lugs, as that is what they can be called, the bolt handle movement is only 50 degrees. Although the bolt handle fits into a slot in the receiver when the action is closed it can hardly serve as an efficient safety lug.

The firing mechanism of the Omega bolt consists of the usual one-piece firing pin, coil mainspring, cocking piece and bolt sleeve. There is the usual deep cocking cam notch and a shallower notch to keep the bolt sleeve from turning when the bolt is open. The bolt sleeve, which has its end closed by a rotating safety, is threaded into the rear of the bolt body. The firing pin threads into the cocking piece and it is kept from turning by a small socket-head screw threaded into the cocking piece.

The Omega has two safeties, one fitted in the end of the bolt sleeve for locking the firing pin, and the other in the rear of the trigger guard. On the rifle I had, neither one works perfectly, and they need work. Anyway, the first safety fits in a hole in the rear of the bolt sleeve, and has means to block the fall of the cocking piece with its connected firing pin. When straight up and down it is in the firing position; swung either to the right or left, the front end of it engages in front of a flare on the end of the cocking piece. This safety is in such a location that with a scope on the rifle it is difficult to manipulate. Also, the safety projects so far back that it might be a hazard to some shooters in that it could injure a hand when the rifle is fired.



The rear of the Omega bolt showing (A) bolt sleeve, (B) safety and (C) cocking piece.



This photo shows the rear end of the Omega receiver and the butt-stock inletting. Only one screw anchors the stock to the action.

Rear view of the trigger mechanism in the Omega action. Arrow points to trigger adjustment screw.



The second safety is a simple cross-bolt affair built into the rear of the trigger guard. Pushed to the right it is on the Safe position and blocks the trigger. Perhaps this safety is reversible for a left-handed hunter, but I am not sure.

The trigger mechanism is the usual and common system used on many modern rifles consisting of the trigger, sear and the pins, springs and screws mounted in a housing. It is a single-stage trigger with one adjustment, that of weight of pull.

The Omega bolt-stop is somewhat similar to the one used in the Weatherly rifle. It is a simple round plunger projecting up into the bolt raceway. The bolt body is grooved to slide over it with the stop also serving as the bolt guide. Depressing a small plunger in the trigger guard pulls the stop down to release the bolt.

The magazine in the Omega is of the rotary type. Its spool is positioned in the center of the receiver below the bolt. It rotates on an axis and is spring tensioned to feed cartridges out of the magazine. The center of the spool is hollow to accept the spring. Unlike the Mannlicher-Schoenauer and Savage M99 spools which have dividers between each cartridge, the Omega's has only one flap. As the cartridges are loaded into the magazine, each one pushes against the one loaded before it. And what is also unique there is a ratchet at the rear end of the spool—as each cartridge is inserted a lever engages the ratchet to hold the spool against spring tension until another cartridge is inserted. The magazine will hold five standard cartridges and four magnums. The lever that holds the spool is connected to the bolt-stop and what follows tells us that Mr. Koon was a very clever inventor.

To load the rotary magazine, the bolt must be open. After one or more cartridges have



Left side of the Omega III Rifle. This particular rifle is chambered for the 300 Winchester Magnum. The rifle was also chambered for other popular calibers such as the 270, 30-06, 7mm Remington Magnum, 338 Winchester Magnum and others.

General Specifications

Type	..... Bolt-action repeater, operated by bolt handle.
Receiver	..... Two piece steel construction.
Stock fastening	By a single tang screw (see text).
Bolt	..... One piece with octagon-shaped body and square bolt head with four locking surfaces.
Ignition	..... One-piece firing pin which is threaded into cocking piece, coil mainspring, cocks on up-lift of bolt handle.
Magazine	..... Rotary type (see text).
Trigger	..... Single stage, adjustable.
Safety	..... Dual safeties; one, a cross bolt in the trigger guard locks trigger; the other, mounted in bolt sleeve locks the firing pin.
Extractor	..... Spring tension claw type.
Ejector	..... Spring-back plunger in bolt head.
Bolt-stop	..... Round plunger in bottom of receiver, engaged with groove in bolt. Also serves as bolt guide.
Takedown	..... None provided.

Dimensional Action Specifications

Action length	..... 9.250"
Action width	..... 1.250"
Bolt diameter (Point to Point)	..... .870"
Bolt travel	..... 4.312"
Striker travel	..... .200"

been inserted into the magazine nothing happens when the bolt is closed. However, when the bolt handle is turned all the way down there is an angled surface at the end of the bolt-stop groove which, as it moves over the top of the bolt-stop, depresses it to disconnect the ratchet lever from the ratchet on the spool. It allows the spool to push the cartridge into the path of the bolt and into the chamber. Then, as the bolt handle is turned down, the next cartridge is released and the process repeated. Clever? Yes.

When one or more cartridges are in the magazine the topmost cartridge is loose. If the rifle is tipped far to one side or entirely over, the cartridge would drop out if it were not for the light steel, spring-type cartridge stop fitted into a recess in the right receiver rail. When the bolt is closed it pushes this stop down level with the receiver, and springs out again when the bolt is open. The spring is light enough not to interfere when the cartridges are inserted into the magazine, but strong enough to hold a single cartridge from dropping out. It is all quite clever.

But the cleverest part is still to come. If the magazine is loaded and you want to unload it without feeding each cartridge in and out of

the chamber, you merely depress the bolt-stop button and the cartridges will fly out. When this is done you should hold your hand over the action to catch the cartridges. Also, if the magazine is unloaded in this manner and if the muzzle is elevated, the bolt will also drop out. With cartridges in the magazine, the first time the bolt is closed it will not pick up a cartridge. This feature might be handy to make the rifle a six-shot repeater in standard calibers and a five-shot repeater in magnum calibers. Whenever the bolt is opened with cartridges in the magazine, on the upturn of the bolt handle the ratchet mechanism will release one cartridge by the action of the bolt against the bolt-stop. When the ratchet is released in this manner the bolt-stop is depressed only enough to release the ratchet, but not enough to allow the bolt to fall out. If you can make sense out of all of this I will give you "A" for effort.

Comments

Mr. Bauman informed me that he has fired several boxes of ammunition through his Omega. He found the rifle quite pleasant to shoot, probably as a result that with the scope it weighs 9.5 pounds. But more than that he

found it to be much more accurate than he ever expected, giving close to MOA five-shot groups.

Whoever made the stock and forend for this rifle did a very good job of mating the wood to the metal, sanding the wood very smooth and level and applying the finish on it. However, to my way of thinking, he did a poor job with the pistol grip. I would want it about $\frac{1}{8}$ " further back so as to not crowd the trigger hand or bruise a finger from the recoil of firing. I would also have shaped its entire length to the same dimensions and shape of the pistol grip cap. Lastly, I would want both the forend and pistol grip to be checkered a generous amount, twenty lines per inch preferred.

I am a bit dubious about the square bolt head and the minimum amount of locking surface these four corners provide.

I would also insist that the buttstock be fastened on with a through-bolt. I have no information as to how many Omega rifles were made, or when last made, or about its designer, Homer E. Koon Jr. However, those who own one of his rifles will remember him for his contribution to the field of bolt-action rifles.



Remington Model 788

TO OFFER THE sportsman a line of low-cost rifles based on a single turnbolt action, Remington designed and engineered a system that could be used for 22 rimfire cartridges as well as for various centerfire cartridges. Doing this not only facilitated the manufacture of these rifles and held down manufacturing costs, it also enabled the sportsman to buy a rimfire small game rifle and a centerfire varmint and/or big game rifle having similar actions. The entirely new action Remington developed featured multiple rear locking lugs.

Introduced in 1967, the new centerfire rifle was designated Model 788. At first it was chambered only for the 222 Remington, 22-250, 30-30 and 44 Magnum cartridges, with the 223, 243, 6mm and 308 added later on. In 1969 Remington made the 788 available for left-hand operation, but only in 308 and 6mm.

The rifles had a very trim pistol grip stock made of a hardwood finished to look like walnut. The barrels are 24" long in 222 and 22-250, 22" long in the other calibers. A post front sight on a ramp is screwed to the barrel, with a screw-adjustable open rear sight fitted over a base rib, the two screwed to the barrel. The rifles weigh about 7 pounds in 44 Magnum, about 7.5 pounds in 222 and 22-250.

Although I do not want to include rimfire bolt actions in this book, it is well to mention the Remington rimfire counterparts to the 788. These are the 580 single shot, the 581 clip repeater, the 582 with tubular magazine, and the 540-X single shot target rifle. (Note: All Remington series 580 rifles were discontinued and the 581 reintroduced in 1986.) All are chambered for the 22 Long Rifle rimfire cartridge, but they'll also handle 22 Shorts and Longs as well. Although lighter in weight (except the 540-X) and smaller in size, the 580 rifles have about the same balance and feel as the 788, with the 581 clip repeater the one most like it. Many hunters find it very desirable to have their centerfire and rimfire rifles based on similar actions and made nearly alike. When Remington introduced the 788 it did not replace any other existing rifle in their line-up, but with the advent of the 580 rimfires the older 510 and 510-X series (Models 510, 511, 512 and 513) were discontinued.

Reports published on the 788 in the various gun magazines were enthusiastic. (Note: All model 788 rifles were discontinued before 1984.) Most of them that I read were very favorable. Almost all of those who tested them found the rifles reliable and accurate. The 788 is undoubtedly the most accurate rifle chambered for the 44 Magnum ever made. The 788s in other calibers, including the 6mm, have also proved highly accurate. While the 788 was not much for looks, it performs like a much higher-priced rifle.

The 788 Action

The receiver, machined from a round steel forging, appears to be quite slim, but it is very heavy and rigid. Main wall thickness is slightly over .300". Because the magazine is a single-column type, and because the ejection port is quite narrow, the receiver is not weakened much by these openings. There is much more metal in the walls of this receiver, on either side of the ejection port, than there is in the 700 Remington receiver. The wall opposite the ejection port is unusually rigid. The receiver is 1.325" in diameter over its entire length. The magazine well of the 788 in 6mm and 308 is about .635" wide and about 3.00" long. The ejection port is about 2.725" long and .600" wide. The openings begin at a point about 1.5" behind the front edge of the receiver. The receiver bridge, which begins at the rear of these openings, is about 2.425" long. Its length provides a good deal of contact area with the bolt to guide it. It also provides room for the locking-lug recesses. The receivers of the 788 in other calibers vary slightly from the above figures.

The bolt locking lugs are located just over an inch forward of the rear end of the bolt. There are nine lugs in all, three sets of three equally spaced around the bolt body. Each locking lug is about .085" high and about .150" thick. Two sets are about .250" in width, while the third set of three is about .350" wide. These last three lugs have the approaching corners angled off so that, on lowering the bolt handle, the bolt is forced fully forward. Three circular grooves, inside the heavy-walled bridge, are divided by milling three longitudinal grooves to form the

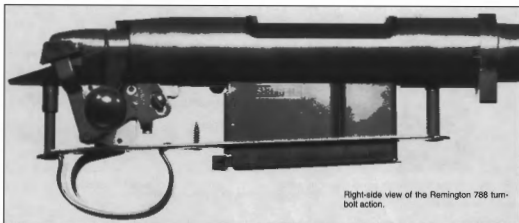
nine locking-lug shoulders. All of this is done with such precision that all of the lugs bear evenly against the shoulders. With the bridge a solid ring of steel at this point, with two very heavy walls connecting the bridge to the ring, and with the receiver and bolt made of quality alloy steel and properly heat-treated, the 788 bolt is locked in the receiver very securely. There is more than enough strength to hold cartridges which develop high breech pressure in the chamber. Locking strength of the 788 action compares favorably to that of the Model 700 Remington, one of the strongest dual-opposed forward locking lug actions made. There is little chance of the nine locking lugs or the locking shoulders ever shearing off under normal conditions. Incidentally, the total area of the nine lugs is about .338 square inch, with a locking contact surface of about .191 square inch. The 98 Mauser figures are .493 and .109 respectively. The three sets of locking lugs are spaced 120° apart, which results in a bolt rotation of 68°.

The base of the bolt handle is brazed to the bolt body. When the bolt is closed part of this base extends into a deep notch in the side of the receiver, and this could act as a safety lug. The tapered bolt handle stem ends in a pear-shaped hollow grasping ball. The bolt handle will clear a low-mounted scope or one with a very large eyepiece. Primary extraction power is obtained when the bolt handle is raised, its base moving over an inclined surface on the rear of the bridge.

In rimless calibers, the 788 bolt is of one-piece construction, the front end counterbored for the cartridge head. The C-spring extractor occupies a groove cut into the rim of this counterbore, and is held in place by a rivet. The ejector, a spring-loaded plunger in the bolt head, is held in place by a small cross pin.

Bolts for rimmed calibers have a separate non-rotating bolt head. A tenon on the rear of this flat-faced bolt head fits into the bolt body, held there by a cross-pin which intersects a groove in the tenon. The spring-loaded ejector, located in the bottom of the bolt head, is held in place by a cross-pin. This ejector also

(Above) Remington Model 788 rifle.



Right-side view of the Remington 788 turn-bolt action.

serves to hold the empty cartridge case against the extractor when the action is opened. The extractor, a long one-piece spring, fits into a slot in the bolt head, its stem extending into the bolt body. The separate bolt head also has a guide pin on its left, which projects into a narrow groove cut into the inside left wall of the receiver. This pin prevents the bolt head from turning when the bolt handle is raised and lowered.

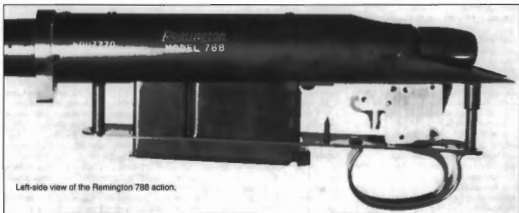
The separate recoil lug is clamped between the barrel and the receiver. The top of this lug extends slightly above the receiver, where it functions as a stop or recoil lug for the scope mount base. The face of the barrel is flat for both rimmed and rimless calibers, although there is a notch cut into the face of the barrel for the extractor of the rimmed cartridge bolt head.

The firing mechanism is simple and well designed. It consists of a one-piece firing pin over which is compressed a coil mainspring

between the shoulder on the front of the firing pin and a washer positioned ahead of the firing-pin head (this part is usually called the cocking piece), which is fastened to the rear of the firing pin by a cross-pin. The bolt is drilled from the rear to accept the firing mechanism. A hollow cap (called the bolt plug by the factory, although normally called the bolt sleeve by most everyone else) is threaded into the rear of the bolt. The front end of its threaded stem contacts the washer positioned between the cocking piece and mainspring. This bolt "plug," closed at the rear, would protect the shooter if any powder gases got into the bolt. There are no gas-vent holes in the bolt or receiver. There is a small hole drilled through the side of the bolt sleeve, and a matching hole through the rear of the cocking piece for the insertion of a thin rod when the action is cocked to facilitate removal of the firing mechanism from the bolt. The striker is cocked on the opening of the bolt.

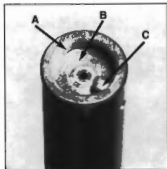
The bolt sleeve is prevented from turning when the bolt is open by the nose of the cocking piece resting in a shallow notch in the rear of the bolt. The firing pin and cocking piece are very light; coupled with a very stiff mainspring, lock time is extremely fast.

The trigger/safety/bolt-stop mechanism is built into an aluminum housing, the latter attached to the bottom of the receiver by a cross pin and tightened by a setscrew in the front of the housing. Inside the top rear of the housing is the sear, which projects partially into the cocking-piece raceway in the receiver. Pivoting on a pin in the bottom of the housing is the trigger, which has an arm contacting the sear. A single small coil spring between the sear and the trigger provides tension to both parts. No adjustments are provided, but the normal trigger pull is very short, and weight of pull is about 4 pounds. The smooth, well-curved finger-piece of the trig-

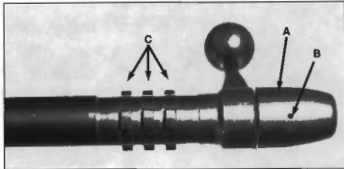


Left-side view of the Remington 788 action.

PART II: Commercial Rifles & Actions



Bolt head of the 788 made for rimless cartridges showing: (A) extractor lip, (B) bolt-face recess, (C) ejector.



Rear end of Remington 788 bolt showing: (A) bolt sleeve (called bolt plug by the factory), (B) hole used for disassembling the firing mechanism from the bolt, (C) locking lugs.

ger is properly positioned in the rear of the trigger guard pivot.

The safety pivots on a pin through the bottom of the trigger housing. The large safety button, positioned to the right of the tang above the stock line, is easy and convenient to operate. A spring-loaded plunger in the trigger housing gives the ON and OFF position to the safety. The plunger also locks the trigger when the safety is tipped back, which also locks the bolt. The safety makes very little noise as it is pushed forward to the OFF or FIRE position, and the safety button is large enough and so shaped that it can be readily moved with a cold or a gloved thumb.

The plunger-type bolt-stop, built into the front part of the trigger housing, is a round pin with flattened top. It projects upward into the receiver boltway and into a narrow slot in the bolt. A coil spring around the bolt-stop keeps it up. The bolt-stop not only halts the rearward travel of the bolt as it contacts the end of the slot, but also guides the bolt and prevents it from turning in the receiver as it is worked back and forth. Part of the sheet-metal safety is bent over to engage a flat spot on the bottom of the bolt-stop. Pushing the safety forward as far as it will go depresses the bolt-stop so the bolt can be removed.

The trigger guard bow is a sheet-metal strap, neatly curved to shape. A bent lip on its front end fastens in a hole in the stamped sheet-metal trigger/magazine plate, which the factory calls the floorplate. Guard screws going through the front end of this plate and through the rear of the guard bow hold the barrel and action in the stock. The rear screw, shorter than the front one, threads into a stud attached to the bottom of the receiver tang.

The single-column box magazine, of heavy-gauge sheet steel, is folded to form a box. Its rear top edges, bent slightly inward, form lips to hold the cartridges and follower in the box. The sheet-metal follower has its end bent down to fit inside the box. Below it is a conventional W-

shaped follower spring. Magazines for rimless cartridges have ridges pressed into the sides of the box, at the shoulder location of the cartridge it is made for, to hold the cartridges to the rear, thus preventing the bullet points from being damaged when the rifle recoils. Rimmed cartridge magazines have a ridge near the rear end for the rim of the case. This holds all but the top cartridge from sliding forward when the rifle is fired. All magazines for the six different cartridges are different, and each one is marked on the right side for the cartridge it handles.

A heavy steel bar, screwed to the bottom of the receiver, extends down behind the magazine well. The rear end of the magazine has its walls bent over so that it will slip over this guide bar. A spring release, attached to the rear wall of the magazine box, engages with the bottom of the guide bar to hold the box in place. The magazine box is also guided and held in position by the opening in the trigger/magazine plate and one in the stock. Enough of the box projects below the stock line to let it be easily removed and replaced with two fingers of one hand.

Evaluation

I would much rather evaluate an action or rifle after I have observed it in use for a few years, but in this case I have no hindsight to help me. It must be remembered that the 788 is a low-cost competitive product. In my opinion, however, it is a lot of centerfire rifle for the money.

The only thing I didn't like about the 788 rifle I received was that the barrel/receiver assembly was not properly or sufficiently rinsed after being blued. Bluing salts trapped between the receiver, barrel and recoil lug began "growing" out of these joints. A week after wiping the dried salts off the first time, they had grown again as much as before, seeping out of the joints and the front scope-mount plug screw. There are two notches across the front face of the receiver, for what purpose I do

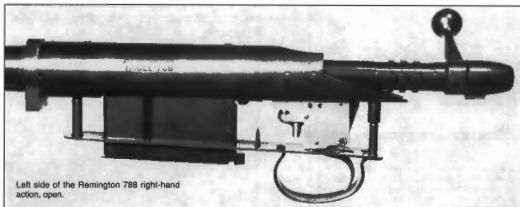
not know, but evidently the salts entered into the barrel-thread area through these notches. It would take considerable rinsing to remove the salt entirely from these confined spaces. The lack of a thorough rinse is also evident by the tacky feel of all of the blued parts of the rifle.

Aside from this, and considering its price, I liked almost everything about this rifle. For hunting game like deer at ranges up to about 150 yards or so, I believe the factory-installed sights are entirely adequate. That they are attached with screws is a good idea, for this makes it easy to remove the sights if a scope is to be used, or to install other open sights of another type or make. The idea of providing a recoil lug for the scope mount base, via the recoil lug, is also a good feature. Drilling 8x40 holes in the top of the receiver for scope mount bases instead of the usual and smaller 6x48 holes is also a good idea. I do think another hole ought to have been provided in the bridge for a four-screw base mounting, or for the installation of a rear target-scope base.

I think the 788 trigger will prove reliable, and I imagine it will satisfy most buyers of this rifle. This is one rifle that has a safety of adequate size, and it's shaped that it can be positively operated. The action has no separate cocking indicator, but the safety can serve in its place since it can only be moved if the action is cocked. Harnessing the bolt-stop to the safety is also a good design idea. As for the bolt-stop, I'd like it better if it were larger in diameter, or preferably flattened, which would present more contact area with the bolt-stop slot in the bolt. It wouldn't hurt if this slot were also a bit deeper.

The rimless cartridge extractor doesn't seem very substantial. I think Remington might have done better here by copying the Model 700 extractor. The rimmed cartridge extractor seems good.

I have no objection to the 788's rear-locking-lug system. I see no chance of the thick-



Left side of the Remington 788 right-hand action, open.

walled 788 receiver "stretching" when the rifle is fired; that complaint about such actions is often voiced but has little validity. I don't think the handloader will be in any way limited because of the rear locking lugs.

The magazine is well made, and the arrangement to guide it and hold it in place is good. It is about as easy to insert and remove as any detachable-box magazine rifle I know of, and it can be done with one hand. The only drawback is that magazines will be lost, and there will be a demand for them long after the 788 is obsolete. I don't particularly like the sheet-metal trigger guard and plate, but for the price one can't ask for more.

I would like to have seen one or two small gas-vent holes in the bolt, either exposed in the ejection port or directed downward into the magazine opening.

Gunsmithing

The amateur gunsmith will find the 788 a prime object for remodeling and refinishing. Here are some of the things that can be done: the outside metal surfaces can be given a higher polish and reblued; the bolt can be polished and jeweled; the screwed-on sights can be replaced with other sights, or one or both entirely removed; a receiver sight can be installed. A

top-mount hunting-type scope can be installed, or a target-type varmint scope. In this case, the front target-scope base can be placed on the barrel instead of the original rear sight, as the screw holes are correctly spaced. One or two holes, however, will have to be tapped in the bridge for the rear target-scope base. The barrel can be shortened to make a carbine out of the rifle. The factory stock can be doled up, reshaped and refinished to individual tastes. If open sights are to be used, the Monte Carlo comb should be cut down. If the barrel is shortened, the forend can also be shortened and thinned. Otherwise a plastic or dark-colored wood forend tip could be added, as well as a pistol grip cap. The forend and pistol grip can be checkered or carved. Several stock firms make several different styles of semi-finished stocks for this rifle so that it can be easily restocked with a piece of wood to your liking. Whether the original factory stock is used or a new stock fitted, I recommend glass-bedding the area around the recoil lug, including the receiver area forward of the magazine to a point about 2" forward of the barrel lug.

Markings

Stamped on the receiver wall in two lines opposite the ejection port is:

REMINGTON MODEL 788

In one line, the following is stamped on the barrel:

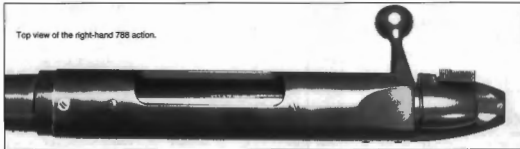
REMINGTON ARMS CO. INC., ILION, N.Y. MADE IN U.S.A.

The caliber designation is also stamped on the barrel. Various inspection marks are stamped on both sides of the breech end of the barrel, including the Remington proof mark—the letters RRP within an oval. The serial number is stamped on the left side of the receiver ring.

Takedown and Assembly

Remove the magazine by grasping the bottom of it between thumb and forefinger, depress the magazine release and pull the magazine from the action. If the magazine is loaded, remove cartridges by sliding each one forward. Raise the bolt handle, pull the bolt back as far as it will go, push the safety fully forward and the bolt can be pulled from the receiver. The bolt for rimless cartridges can be replaced by merely pushing it back into the receiver. To replace the bolt for rimmed cartridges, first align the ejector with the bolt-stop slot and, holding the bolt so the guide pin

Top view of the right-hand 788 action.

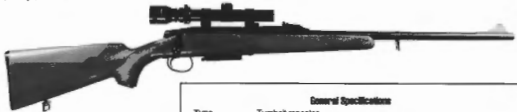


PART II: Commercial Rifles & Actions



The carbine version of the post-1980 M788 with 18.5" barrel.

Right and left views of a Model 788 Remington remodeled by the author. The remodeling included the following: installing a checkered steel pistol grip cap, reshaping the pistol grip to slimmer lines, removing the front sling swivel stud, plugging the hole left by it and re-installing the stud on a band around the barrel, giving the forend more taper, removing the raised comb, sanding the entire stock surface level, staining the wood and giving it an oil finish, and checkering the pistol grip and forend.



Dimensional Action Specifications

Weight (approx.)	40 oz.
Length	8.59"
Receiver diameter	1.325"
Bolt diameter	.700"
Bolt travel	3.220"
Striker travel	.300"
Bolt-face recess:	
Depth	.145"
(rimless calibers only)	
Guard-screw spacing	7.062"
Magazine length (inches)	
(44 Magnum)	1.725"
(222 Cal.)	2.315"
(22-250)	2.410"
(30-30)	2.570"
(6mm & 308)	2.875"

NOTE: Model 788 actions in different calibers do not all have the same specifications as shown above, which were taken from a 6mm action. The 44 Magnum action is a bit shorter and lighter, and actions in other calibers have different bolt travels.

in the bolt head is to the left, insert the bolt into the receiver.

To disassemble the bolt proceed as follows: with the bolt in the receiver, locked with the handle down and cocked, insert a close-fitting pin, drift or Allen wrench through both holes in the bolt sleeve. Raise bolt handle, remove

General Specifications	
Type	Tumbolt repeater.
Receiver	One-piece round steel with non-slotted bridge. Separate recoil lug clamped between receiver and barrel. Tapped for top scope mounts and receiver sights.
Bolt	One-piece for rimless calibers, two-piece for rimmed. Low-profile bolt handle brazed to body. Nine rear locking lugs. Handle can serve as safety locking lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Detachable single-column four-shot box type in 222-caliber, three-shot in other calibers.
Trigger	Non-adjustable single-stage.
Safety	Pivoting side-tang type locks trigger and bolt when flipped back.
Extractor	C-type fitted into bolt-face recesses for rimless calibers; long spring-hook type for rimmed calibers.
Ejector	Plunger-type in bolt head.
Bolt-stop	Plunger-type into trigger housing fits a slot cut into bolt body. Bolt stop is depressed to release bolt by pushing safety forward.

bolt from receiver, then unscrew bolt sleeve from bolt. To disassemble the firing mechanism further, rest the firing pin tip on the workbench, press down on the bolt sleeve and pull out the pin from the bolt sleeve. With a drift punch, drive out the pin from the cocking piece. The mainspring is quite strong, so be careful when pulling out the punch after the pin is removed. Reassemble in reverse order. In reassembling the firing mechanism in the bolt, turn it in as far as it will go, remove the pin, then turn the bolt sleeve back until the cocking cam rests in the shallow notch on the rear of the bolt. The bolt can then be inserted into the receiver if the firing pin and cocking

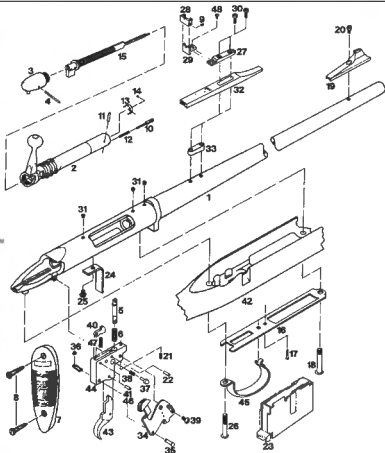
piece are down (in the fired position). In this case, use a square-edged tool and pull the cocking piece back, turning the bolt sleeve at the same time, until the cocking piece rests in the shallow notch.

The bolt head of the rimmed cartridge bolt can be removed by driving out the bolt body cross-pin and pulling the bolt head from the bolt body. This will release the long extractor. The ejector of both bolt types can be removed by driving out the ejector pin. Do not remove the rimless extractor except to replace a broken one. Remove it by driving out the extractor pin.

To remove barrel and action from the stock,

Parts Legend

- 1 Barrel Assembly
- 2 Bolt Assembly
- 3 Bolt Plug
- 4 Bolt Plug Pin
- 5 Bolt-stop
- 6 Bolt-stop Spring
- 7 Buttplate
- 8 Buttplate Screws
- 9 Elevation Screw
- 10 Ejector
- 11 Ejector Pin
- 12 Ejector Spring
- 13 Extractor
- 14 Extractor Rivet
- 15 Firing Pin Assembly
- 16 Floorplate
- 17 Floorplate Screw
- 18 Front Guard Screw
- 19 Front Sight
- 20 Front Sight Screw
- 21 Housing Lock Screw
- 22 Housing Pin
- 23 Magazine Assembly
- 24 Magazine Guide Bar
- 25 Magazine Guide Bar Screw
- 26 Rear Guard Screw
- 27 Rear Sight Base
- 28 Rear Sight Adjuster
- 29 Rear Sight Lock
- 30 Rear Sight Screws
- 31 Receiver Plug Screws
- 32 Rib (Rear Sight)
- 33 Rib Spacer (Rear Sight)
- 34 Safety Assembly
- 35 Safety Pivot Pin
- 36 Safety Pivot Pin Retaining Washer
- 37 Safety Plunger
- 38 Safety Plunger Spring
- 39 Safety Retaining Screw
- 40 Sear
- 41 Sear Pin
- 42 Stock Assembly
- 43 Trigger
- 44 Trigger Housing
- 45 Trigger Guard
- 46 Trigger Pin
- 47 Trigger Spring
- 48 Windage Screw



first take out the magazine, then turn out the front and rear guard screws. Turn out the wood screw from trigger guard/magazine plate and the plate can be removed from stock. To remove the trigger mechanism, loosen the lock screw in front of the housing and drive out the trigger-housing pin. Do not disassemble the trigger mechanism unless it's really necessary, and then with care. The barrel is screwed very tightly into the receiver, and it should not be removed unless you have the proper barrel vice and action wrench to do it.

To disassemble the magazine, press the rear of the follower down far enough so the front end slips out, then pull the follower out. In reassembling, the end of the follower spring should be toward the front of the magazine box.

Changes in the M788

No significant changes have been made in

the Remington Model 788 action since it was introduced. The most noticeable change made was in the stock, this taking place in 1980.

The change in the stock was a minor one—it was made a bit fuller in the pistol grip area and around the action and magazine. In my view the fuller pistol grip was no improvement, but by making the stock deeper below the action Remington put the magazine plate flush in the stock, and this was an improvement.

In 1980, a new caliber was added and some calibers dropped. The new Remington center-fire caliber for which the M788 was chambered was the 7mm-08. Its origin is the 308 case necked down to hold a standard 7mm (.284") bullet. This makes four standard factory cartridges that are based on the 308 case, the others being the 243, 308 and 358.

When last made, the Remington 788 was

chambered for the following: 223, 22-250, 243, 7mm-08 and 308. The list of calibers for the 788 was at one time longer than this, including four chamberings that have been dropped. They are the 222, 222 Magnum, 30-30 and 44 Magnum.

Another change in the M788 that occurred in 1980 was in the barrel length. The 788 made in the 223 and 22-250 calibers has a 24" barrel, while the barrel is only 18.5" long for the other calibers. The short-barreled model could be called the carbine model.

The Remington M788 in 223-caliber is very popular in my section of the country with varmint and pelt hunters. For this work, the M788 and the 223 is a fine combination.

About 1984, Remington announced they were dropping the Model 788 from production.



Remington Model Seven Carbine & Model 700 Mountain Rifle

1. Remington's Model Seven

IF YOU HUNT whitetail deer where the cover is thick and the going rough and snap shots are the rule, and if you like your rifle to be a bolt action, then you probably will like Remington's Model Seven carbine. You might even decide after handling it for the first time and swinging it to your shoulder and sighting it, that it is the ideal gun for this sport. Its lightness and compactness will impress you, and so will its appearance, because it is a very neat little package.

Remington has been making sporting rifles for a very long time, and throughout these years they have produced many carbines for the deer and black bear hunter. One of the earliest was a 44-40 single shot based on a rolling block action. Others followed on other types of actions. There were a couple of medium- and high-powered slide action carbines, one of them chambered for the 35 Remington, a very popular cartridge with deer hunters at one time. At times Remington also made some short-barreled rifles on bolt actions, but most

of them were merely the regular sporting rifle with the barrel shortened, and these they called carbines. Not too long ago Remington made two bolt-action carbines of unusual design and appearance. They were the Models 600, and 660 and their looks took a lot of getting used to. I never did get used to them. I thought they were ugly. Perhaps so did a lot of other shooters, because they did not survive for very long. Then came the Model Seven, Remington's latest, and in my opinion, their best ever. This time they designed it to be a carbine, and designed it to look and feel like a rifle. Remington did a fine job of it.

In 1948 Remington introduced a turnbolt action which proved so successful it is still being used today. The first rifle Remington built on it was the Model 721. What followed was a succession of many different calibers, styles, and types of rifles built on it, including the M722, 700, 600, 660 and the 40-X series. These actions varied in minor details but the basic receiver, bolt and trigger design remained almost the same. Some call it the strongest turnbolt action made. Anyway, it is the basic action design that Remington chose to use for their Model Seven carbine.

The Carbine

The Remington Model Seven is an extremely compact and lightweight hunting carbine. It has a round tapered barrel 18.5" in length with a muzzle diameter of only .560". Screwed to the barrel is a ramp front sight (into which is dovetailed a bead sight) and an open rear sight which is adjustable for windage and elevation. Open sight spacing is 12.875". Empty and without sling, it weighs approximately 6.25 pounds. Overall length is 37.625". The staggered-column magazine has a hinged floorplate/trigger guard made of steel. The safety is located behind the bolt handle and it locks only the sear. It has a single-stage adjustable trigger, and the receiver is drilled and tapped for scope mounts. All exposed metal parts are polished and blued except the bolt, which is bright.

Made of American walnut, the stock is fitted with a solid rubber buttpad, black plastic pistol grip cap and quick detachable sling swivel studs. Length of pull is 13.375" and length of forend from trigger is 15.75". A subdued schnabel finishes off the tip of the forend. A generous amount of laser-cut checkering is cut into the gripping areas. The stock has a semi-gloss finish, and the minimum dimensions of the stock are in keeping with the minimum dimensions of the barrel. Remington makes this carbine in calibers 17 Rem., 6mm Rem., 223, 243, 7mm and 308.

The Action

As mentioned earlier, the Remington Model Seven action is a hybrid between the M600 and the M700. It could also be described as a compact M700 BDL. It is as compact as it can be made and still accept



Here the Model Seven Carbine is shown fitted with a Leupold hunting scope in Leupold mounts, and with a leather carrying strap.

(Above) The Remington Model Seven Carbine. It has an 18.5" barrel and weighs only about 6.25 pounds.



The Model Seven action—light in weight, compact, strong and safe.

the 308 cartridge and have it look the way a turnbolt action is expected to look. It has all the good looks of the M700 BDL, and none of the pushed-in-from-behind look of the M600.

The receiver of the Seven is approximately 7.625" long and 1.360" in diameter, being machined from a single piece of steel tubing. At first glance it appears to be a M600 receiver with a tang added to it. Up front, the barrel is threaded into the receiver, and the separate recoil lug is held between the barrel and the receiver. The face of the barrel is recessed to accept the head of the bolt. Inside the receiver, twin locking shoulders and locking lug raceways are machined for passage of the dual opposed solid locking lugs on the bolt. All of this—recoil lug, recessed breeching and dual opposed locking lugs—was used originally on the M721. The loading/ejection port resembles that of the M600

receiver, being narrower than the port in the M700 receiver.

At the rear of the receiver a notch is machined to accept the root of the bolt handle, and this serves as the safety or third locking lug for the bolt. The top of the receiver ring is round while the top of the bridge is flattened, this being similar to the M722 with the only difference being that the Model Seven bridge is very short. Two scope-mounting holes are drilled and tapped in the receiver ring, but only one is provided in the bridge.

Except that it is shorter, the bolt of the Seven is essentially the same as originally used in the M722, with recessed bolt face, internal ring extractor, plunger-type ejector, twin opposed locking lugs, bolt sleeve, cocking piece, striker and mainspring. The bolt sleeve is flattened on the right side to clear the safety, and the bolt handle shank with its

off-round bolt handle knob is swept back. There is a gas vent hole between the locking lugs on the left side of the bolt to emit gas into the left locking lug raceway should any gases enter the bolt due to a ruptured primer. A hole in the right side of the receiver ring will take care of any gases that escape in that direction.

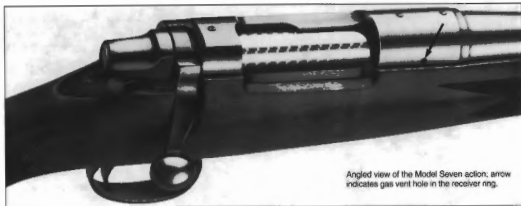
The trigger mechanism is probably the same one Remington uses in their M700—it is a mechanism that has proved to be reliable in every way. It is attached to the bottom of the receiver by two cross pins. There are three adjustment screws for the trigger, but these have been properly set and sealed at the factory. My Model Seven has a trigger pull of 4.5-5 pounds.

The safety on the carbine is built into the trigger mechanism. The button to operate it is well positioned above the stock line so that it is easily manipulated, and there is enough



Left side of action with bolt open.

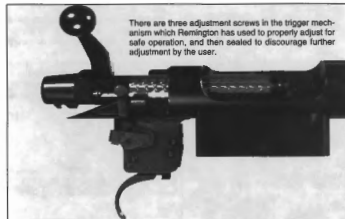
PART II: Commercial Rifles & Actions



Angled view of the Model Seven action; arrow indicates gas vent hole in the receiver ring.



Top view of the action.



There are three adjustment screws in the trigger mechanism which Remington has used to properly adjust for safe operation, and then sealed to discourage further adjustment by the user.

movement to tell the shooter that it has been moved. Tipped back, the safety locks only the sear. No provision is made for the safety to lock the bolt and it is not a silent safety.

The bolt-stop is a lever fitted into a groove in the rear left of the receiver. It is spring tensioned and pivots on a pin, with its front end projecting into the left locking lug raceway. A vertical sliding arm mount-

ed on the trigger housing has a button located in front of the trigger that provides the means to depress the bolt-stop to remove the bolt.

The magazine well opening in the bottom of the receiver is machined, leaving cartridge guide lips on both sides to hold a staggered column of cartridges in the magazine, and to guide them singly into the chamber.

Positioned at the bottom of the receiver is a thin sheet steel box or shell to contain the cartridges. It has smooth sides, which means it has no provisions to hold the cartridges rearwards to prevent bullet nose damage when the rifle is fired. Below this box and inletted into the bottom of the stock is the trigger guard with hinged floorplate. These parts are lightweight sheet-steel stampings with the separate trigger guard bow being the heaviest part of it. Two guard screws through holes in each end of it and through the stock, and threading into the receiver, hold the barrel and action in the stock.

The follower is a bright steel stamping. It fits over one end of a regular W-shaped follower spring, and the other end of this spring is fitted in grooves in the floorplate. The floorplate, which is hinged to the very front end of the trigger guard, is locked closed by a spring-actuated latch built into the guard. The front end of the floorplate covers the front guard screw. The front end of the trigger guard rests against a steel block inletted into the stock. All parts of the action are made of steel and made as light in weight as practicable.

Markings

My Remington Seven is marked as follows: Stamped on the left side of the receiver is:

MODEL SEVEN

The serial number is stamped on the left side of the receiver ring, etched on the bottom of the bolt body and on the trigger housing. It is prefaced by the digits 76. On the left side of the barrel is stamped:

WARNING—READ INSTRUCTION BOOK FOR SAFE OPERATION—FREE FROM REMINGTON ARMS COMPANY, INC. ILION, N.Y. U.S.A. ****

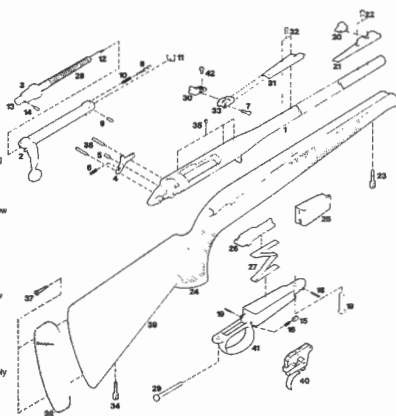
The caliber designation is stamped to the right of the above two lines.

Parts Legend

- 1 Barrel Assembly
- 2 Bolt Assembly
- 3 Bolt Plug
- 4 Bolt Stop
- 5 Bolt-stop Pin
- 6 Bolt-stop Spring
- 7 Elevation Screw
- 8 Ejector
- 9 Ejector Pin
- 10 Ejector Spring
- 11 Extractor
- 12 Firing Pin
- 13 Firing Pin Assembly
- 14 Firing Pin Cross Pin
- 15 Floorplate Latch
- 16 Floorplate Latch Spring
- 17 Floorplate Latch Pin
- 18 Floorplate Pivot Pin
- 19 Front Guard Screw
- 20 Front Sight
- 21 Front Sight Ramp
- 22 Front Sight Ramp Screw
- 23 Front Swivel Screw
- 24 Grip Cap
- 25 Magazine
- 26 Magazine Follower
- 27 Magazine Spring
- 28 Main Spring
- 29 Rear Guard Screw
- 30 Rear Sight Aperture
- 31 Rear Sight Base
- 32 Rear Sight Base Screw
- 33 Rear Sight Slide
- 34 Rear Swivel Screw
- 35 Receiver Plug Screw
- 36 Recoil Pad
- 37 Recoil Pad Screw
- 38 Rear Pins
- 39 Stock Assembly
- 40 Trigger Assembly
- 41 Trigger Guard Assembly
- 42 Windage Screw

Parts Not Shown

- Grip Cap Insert
- Grip Cap Screw
- Magazine Spacer



Dimensional Action Specifications

Receiver length	7.625"
Receiver diameter	1.380"
Bolt diameter	.700"
Bolt travel	3.650"
Striker travel	.270"

Comments

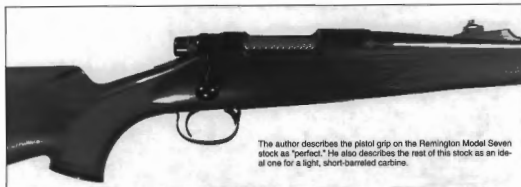
Over the years I have enjoyed no pastime more than the one of remodeling rifles. In recalling some of the many rifles I remodeled, it seems I got the most satisfaction from converting a clumsy military rifle into a lightweight sporter. I often went to extremes to come up with this weight reduction. To achieve what I wanted, I often trimmed metal from the action, turned down and shortened the barrel, and then stocked the rifle to

General Specifications

Type	Manually operated bolt-action repeater.
Receiver	One-piece machined construction, solid bridge, drilled and tapped for scope mounts, separable recoil lug between receiver and barrel.
Bolt	Three-piece brazed-together construction, dual opposed forward locking lugs, bolt handle serves as third locking lug.
Extractor	Circular spring clip inside bolt face recess.
Ejector	Spring-backed plunger in bolt face recess.
Bolt-stop	Pivoting arm built into receiver and projecting into left locking lug recess-way.
Trigger	Single-stage trigger.
Safety	Pivoting safety built into trigger, locks rear.
Magazine	Staggered-column box magazine with hinged floorplate.

minimum proportions. Although I never hunted big game, I nevertheless made up lightweight rifles for this sport. There was a lightweight mountain rifle in .270 caliber that I thought ideal for the goat and sheep hunter; a 7-pound, open-sighted 338 Magnum on a

fine M1903 Springfield action, and a featherweight 257 Roberts on a Mauser action, for antelope. Never once did I make one so light, trim and compact as the Remington Model Seven, although I came close. In this rifle Remington did what I often strived for,



The author describes the pistol grip on the Remington Model Seven stock as "perfect." He also describes the rest of this stock as an ideal one for a light, short-barreled carbine.



Left-side view of the Remington Model Seven Carbine.

that is, a deer rifle for the deer hunter, a rifle of minimum weight and size, and a rifle that looks and handles like a rifle should. In the Model Seven, Remington has come very close to making the ideal bolt-action deer rifle.

I like the rifle, but I would like it even better if it would be made a bit differently. To me, an 18.5" barrel looks sawed off; I would have made it with a 20" barrel, or perhaps an inch or so longer. Next, I would have placed the front sling swivel on the barrel ahead of the forend tip where it belongs if it is not to interfere with the shooter. I have never been too keen about hinged floorplates, but maybe I would change my mind if I were a deer hunter. Just the same, the trigger guard and the hinged floorplate on the Seven look a bit on the puny side to me. The floorplate projects below the surface of the stock even though the stock could have been made so that it would be flush. Lacking that, I would have wanted the edges of the floorplate rounded.

Other than the above, I very much like the Model Seven. I like the compactness of the action, the ease and smoothness by which the bolt can be operated, the shape and style of the bolt handle, the placement and movement of the safety, the size and contour of the barrel and the sights mounted on it.

Above all, I like the walnut stock, especially the shape, size and styling of it. The pistol grip is perfect, and the rubber buttpad, pistol grip cap and the forend schnabel are to my liking. The checkering is also good. I would like to have the surface of the stock sanded somewhat more level and a duller finish, but other than this, and the placement of the front sling swivel stud, I think this stock is a perfect one for a short-barreled lightweight carbine.

My Remington Model Seven is chambered for the 7mm-08 cartridge, which Remington introduced in 1979. As the name suggests, this cartridge is of 7mm caliber (.283" bullet diameter) and is based on the 308 cartridge case. It thus becomes the fourth commercial cartridge based on the case, the others being the 243, 308, and the 358. Ballistically, the 7mm-08 is little different from the 90-year-old 7x57mm Mauser.

It should prove to be an excellent choice for the deer hunter. The deer hunter will certainly find the Model Seven a handy gun to take into the field, and the 7mm-08 should prove ideal to take deer-size game. Because this carbine has a very short barrel and is very light, you can expect it to have considerable recoil and muzzle blast in calibers 7mm-08 and 308. You probably won't no-

tice this too much when firing at game, but I can assure you that you will take note of it when sighting-in this carbine. A couple of experienced shooters tested my carbine. Firing Remington ammunition loaded with 140-grain, soft-point bullets, and despite very unpleasant muzzle blast and recoil, they could keep most shots within a 1.5" circle at 100 yards. That's very good accuracy, but shooting this carbine from a benchrest was no fun.

Four More Interesting Model Seven Cartridges

Designing and introducing the walnut-stocked Model Seven carbine was Remington's entry into the long-dormant field of centerfire thumbbolt carbines. They did a good job of it too, with the results being that they introduced four more of these light and short-barreled rifles. I have a very high regard for walnut as a stock wood. For this purpose it has no equal. It is traditional and I like traditional rifles. But others less traditional-minded than I seem lured to a new stock material, and three of the additional crop of Model Sevens have stocks of this material. The material? Why it's the so-called high-tech manufactured synthetic that is mostly fiberglass, graphite and other such non-wood material.



An attractive subbed schnabel forend tip adorns the Model Seven stock, giving the gun a racy look. Checkering is cut by a laser.

Also traditional with me are blued steel metal parts, but in two or three of the later Model Seven guns Remington uses stainless steel. Most of the rifle manufacturers have one or more of their rifles with barrels made of stainless steel, some have the receivers and bolts also made of this steel, and some even have all the metal parts made of it. A rifle made in part or entirely of stainless steel with these parts left bright appeals to a lot of rifle buyers. I have no quarrel with stainless steel in rifles, but I would much prefer it be finished to take away its brilliance. Some rifles are being finished this way. But science is taxed to find a practical method to put an honest-to-gosh gun blue finish directly on stainless steel.

Following are the four additional Model Seven rifles as listed in the 1995 GUN Digest:

The lowest cost Model Seven is the **Youth Rifle**. It has hardwood stock stained to look like walnut and is not checkered, but is fitted with a rubber buttpad and sling swivel studs. It is made with a blind magazine and has a length of pull of 12 $\frac{1}{16}$ ". Otherwise it is the same as the original Model Seven pictured at the beginning of this chapter. It is designed especially for the

youthful hunter. Available in 243, 6mm Rem. and 7mm-08 calibers, it was introduced in 1993.

Another rifle is the **Model Seven SS**. In 1994, Remington combined the accuracy and compactness of the Model Seven with the all-weather durability of a 416-grade stainless steel barreled action and synthetic stock. The new 20" barrel keeps the overall weight of the gun at just 6 $\frac{1}{4}$ lbs. The unblued metal work has a satin finish that won't reflect light, and the stock has a classic forend profile with a black, textured finish. Available in 243 Win., 7mm-08 Rem. and 308 Win. Introduced in 1994.

The third rifle is the **Model Seven Custom KS**. Similar to the standard Model Seven except it has a custom finished stock of lightweight Kevlar aramid fiber, and is chambered for 223 Rem., 7mm-08, 308, 35 Rem. and 350 Rem. Mag. Barrel length is 20", weight 5 $\frac{1}{4}$ lbs. It comes with iron sights and is drilled and tapped for scope mounting. The 35 Remington is an old and once very popular whitetail deer cartridge. It is as effective today as it was years ago. Many deer hunters will welcome this chambering in this rifle. Introduced in 1987.

The last Model Seven, and the one I

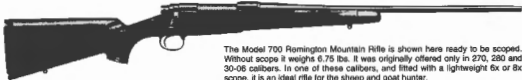
would choose if I wanted another Model Seven, is the **Model Seven Custom MS Rifle**. It is assembled in Remington's Custom Gun Shop. This compact rifle is built around a 20" Custom Shop barrel fitted to the Model Seven action, and bedded in a classic, satin-finished, full-length Mannlicher-style stock. The select hardwoods have been chosen for their clear grain, and pressure-laminated for the strength and dimensional stability demanded of this design. The buttstock features a straight comb with raised cheekpiece and 1" black rubber recoil pad. Checkering on the pistol grip and forend is cut 20 lines to the inch for good control. The front of the carbine is finished off with a steel Mannlicher-style forend cap, and sling swivel studs are supplied fore and aft. The Model Seven MS is furnished with a hooded blade front sight, and an adjustable ramp rear sight. The receiver is drilled and tapped for scope mounts. Metal finish is Remington's traditional high-polish blue. The Model Seven is available in eleven short-action calibers including 222 Rem., 223, 22-250, 243, 6mm Rem., 7mm-08 Rem., 308, 350 Rem. Mag. Calibers 250 Savage, 257 Roberts, and 35 Rem. available on special order. It was introduced in 1993.

2. Remington's Model 700 Mountain Rifle

The Remington M700 Mountain rifle is just one of the many models, types and

styles of sporting rifles based on the basic M700 action. Like all the others, it has an action proven by time. General Julian Hatcher, in an article in the *American Rifleman*, described this action as perhaps the strongest and safest one ever made. The

General was talking about the Remington Model 721, and it is that action that is the granddaddy of the Model 700 action. In all that time the only major change made from the M721 is in the trigger guard and floorplate unit. The bolt, firing mechanism and



The Model 700 Remington Mountain Rifle is shown here ready to be scoped. Without scope it weighs 6.75 lbs. It was originally offered only in 270, 280 and 30-06 calibers. In one of these calibers, and fitted with a lightweight 6x or 8x scope, it is an ideal rifle for the sheep and goat hunter.



Right- and left-side views of the Remington Model 700 Mountain Rifle fitted with a 3-9x telescope in Redfield Jr. mounts.

receiver are little changed from the original M721.

If you have not forgotten from reading about the M721, the bolt, as in all the others, is of three-piece construction. The three pieces are the bolt handle, bolt body and the bolt head, and they are so precisely made, fitted and silver brazed together that unless you did not know this fact, you would have a difficult time finding the joints. The only

strain that is put on these joints is that of the bolt handle, and in my gunsmithing experience working on a large number of these Remington rifles I have only ever seen one in which the bolt handle came off. The only reason that the bolt handle did come off was that a too-hot handload froze the bolt, and the owner used a sizable stick of stove wood on the bolt in his effort to open it.

About the only other criticism I have heard about the action is of the extractor. To be sure, it is a rather smallish part to play such an important role, but by George, it works. I have only ever replaced one, and that was because I broke the original one on removing it from the bolt.

The M721 and its offspring have been used, and still are being used for everything from the 222 to the larger power-packs like the 300 Weatherby Magnum, 458 Winchester Magnum and the latest rage, the 416 Remington.

When I acquired my M700 Mountain rifle it was available only in the 25-06, 270 Winchester, 280 Remington and the ever-popular 30-06. Later, additional calibers were added including the 243, 257 Roberts, 7x57, 7mm-08 and 308. My Mountain Rifle is chambered for the 30-06. This rifle has a slender 22" barrel having a muzzle diameter of .590". It has no open sights—it is made for scope use only. This rifle has the usual and time-proven trigger and safety mechanism, which did not need any further adjustment than the factory adjustment job. The safety locks the sear rather than the trigger, and this is as it should be. My rifle has a walnut stock, and its forend is bedded to put

some upward tension on the barrel. I do not much like the stamped steel trigger guard and floorplate, but they will do.

I acquired my Mountain Rifle not long after getting my Model Seven, and one thing I noticed was the Mountain Rifle has an anti-bind bolt feature while the Model Seven did not have it. A number of modern bolt-action rifles have this feature, and some have used it much longer than Remington. What this anti-bind feature consists of is a rail on the inside of the right receiver wall that extends almost the length of the receiver. To complete the anti-bind feature, a groove is cut into the right locking lug to slide over and along this rail. This feature is a small thing and I am not sure just how much good it does, but it seems to be a feature that shooters believe a bolt-action rifle should have.

Of course, the stock on my Mountain Rifle is walnut. I would have no other. In keeping with the slender barrel, the stock is also of bare minimum dimensions for a high-powered rifle. This includes the buttstock, pistol grip and forend. I rather like it. The comb has almost no drop, and that is good because that will reduce the effect of recoil on the shooter's face. It is fitted with a round-edged, English-style rubber buttpad that resembles a leather covered one. There is a smallish cheekpiece, but quite a bit of good checkering on both the pistol grip and forend. It also features a black forend tip and pistol grip cap. It is also fitted with sling swivel studs. For those who demand the strongest and most weather-resistant stocks, Remington has this rifle available with a synthetic stock. Remington designated this rifle as the Model 700 Custom KS Moun-



Arrow points to the groove in the right locking lug which is part of the anti-bind feature. This feature is found in most all the Remington Model 700 rifles made after about the mid-1980s.



tain Rifle. It has a stock finished with a Kevlar-reinforced resin synthetic. It has a 24" barrel. Weight is 6 lbs. 6 oz. It is also available in right- or left-hand versions. This model has a great array of calibers to choose from, including 270 Win., 280 Rem., 30-06, 7mm Rem. Mag., 300 Win. Mag., 300 Weatherby Mag., 35 Whelen, 338 Win. Mag., 8mm Rem. Mag., and 375 H&H. This model was intro-

duced in 1986. I would choose this stock myself if I ever went on an expensive big game hunt in the far north country, and I would also choose that the rifle be chambered for the 30-06 cartridge.

I mounted a Weaver K-6 scope on my M700 Mountain Rifle using Redfield Jr. mounts. Then, using some old military National Match ammunition, I had two shoot-

ers test the rifle from benchrest over a 100-yard range. The rifle emitted a very sharp report and a sharper recoil, but being seasoned shooters, they objected only mildly. And the results? After the twenty shots were fired, each shooter presented me with two five-shot groups of well less than minute-of-angle. That, my friend, speaks well of the rifle, caliber and shooters.



Remington Models 30, 30S and 720

AFTER MAKING A great many P-14 Enfields for Great Britain, and over a half-million 1917 Enfields for the U.S., from 1915 to 1918, it may be said that Remington knew how to make these rifles, for by the end of 1918 they were turning them out at a rate of about 4000 per day. When the contracts for these rifles were canceled—the British contract in June, 1917, and the U.S. contract in November, 1918—the many machines Remington had making these rifles were left idle. They were also left holding a huge inventory of completely and semi-finished parts, probably enough to make up many more thousands of rifles. To recoup something from this vast operation, they apparently decided to keep some of these machines and tools and, with the vast stock of parts on hand, to produce a sporting model based on the 1917 Enfield action. Thus it was that in 1921 Remington introduced the Model 30 high-powered sporting rifle.

What Remington did was to modify the 1917 barrel and action assembly for sporting use and then fit a conventional lightweight sporting stock to it. The barrel, like the military issue barrel but shortened, was polished and fitted with a band-type front sight base to retain a dovetail bead front sight.

The action was sttimmed and lightened by milling the bridge to the same diameter as the receiver rings and straightening the front tang of the trigger guard. Fitted with a simple receiver sight and sporter stock, this rifle was introduced as the Model 30 High Power, Bolt Action, Sporting Rifle.

The M30 rifle was first made in 30-06 only. Its first barrel, 24" long, was contoured and tapered just like the military barrel, although it probably was somewhat smaller in diameter because of polishing.

The stock, of plain American black walnut, was fitted with a curved steel buttplate, grooved to prevent slipping, and had a reinforced toe to prevent the stock from splitting. The stock had an uncapped half-pistol grip and a slim tapered forend, with finger grooves, that ended in a schnabel tip. It was fitted with sling swivel eyerings, the front one through the forend and threaded into a barrel band. These first rifles were furnished with a Kerr service-type canvas or web sling and open-end swivel hooks. The rifle weighed about 8 pounds and was 45" overall.

When first made, the M30 was also available in Remington's F Grade. This rifle had an engraved action, finely checkered fancy walnut stock, and a foreign-made scope in special mounts.

The M30 action is, in every way, practically identical to the military 1917 action, except as noted above. The double-stage military trigger mechanism was retained, as well as the bent-back bolt and the safety. The action, of course, was made to closer tolerances than the military action, and it was well finished, polished and blued. Remington most likely made the barrel and action of the same steels used in making the M1917 rifles, as well as giving the steels the same heat-treatment. Remington proof-tested these barrels and actions with loads developing 70,000 psi breech pressure.

The rear sight used on the original M30 is most interesting. Its base, dovetailed into the top of the bridge, angles upward to the rear and is grooved to accept a slide with an integral peep disc. Elevation changes are made by moving the slide to the rear. A spring-loaded screw plunger through the base engages in notches in the bottom of the slide; by depressing this plunger to the right, the slide can be moved. An additional

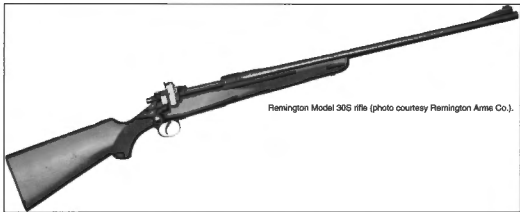
lock screw in the slide can be tightened to secure the slide even if the plunger is depressed. Windage adjustment was obtained by driving the entire sight to either side in its dovetail slot. This sight was soon discontinued, after which the rifles were fitted with an open sight dovetailed into the barrel band.

After making the M30 for a few years, Remington made some changes. Its original skimpy stock was improved by omitting the finger grooves in the forend and making the comb a bit higher and thicker. The grip and forend of the new stock were checkered and a crossbolt added through the stock to strengthen the wood around the recoil shoulder area. By this time, the rifle was dubbed the Model 30 Express. A Model 30 Express Carbine, with 20" barrel, was also introduced. Up to 1932, both were available only in 30-06 caliber.

The Model 30S

Around 1930, Remington introduced the Model 30S, a special or deluxe version of the M30. It was greatly improved—the stock was much better designed and shaped, with a steel shotgun-type buttplate, a full pistol grip with cap, a fuller and higher comb better suited for telescope sight use, and a fuller forend with a rounded tip. Grip and forend were checkered. Sights on the 30S were the fine Lyman 48 receiver sight and a gold bead on a band ramp base. No forend barrel band was used on the 24" barrel. Up to 1932, the action was the same as that on the M30, chambering was only for the 30-06, and the double-stage military

(Above) Remington Model 30R Express Carbine.



Remington Model 30S rifle (photo courtesy Remington Arms Co.).

trigger and the "cock-on-closing" features were kept.

1933 Changes

Some important changes were made in the Model 30S from 1932 to 1933. The Model 30 rifle was designated the Model 30A Standard, the carbine became the Model 30R Carbine and the Model 30S had the word "Special" tacked to it. The most important changes were in the actions, for they were now made to cock on the uplift or opening motion of the bolt, and the trigger was altered to a short, single-stage pull.

On the 30A and 30R, the barrel band was retained, the open rear sight fitted into a dovetail slot cut into the band. The forend-to-barrel-band fastening was eliminated, and Remington described this as a "floating barrel to give maximum accuracy." Finally, several new calibers were added: the 30A and 30R were offered in 25 Rem., 30 Rem., 32 Rem., 35 Rem., 7mm Mauser (7x57) and 30-06; the Model 30S was made only in 25 Rem., 7mm Mauser and 30-06—the 25 Rem. with a 22" barrel. In 1934, the 257 Roberts was added to the 30S lineup of calibers. It is believed that a few of these rifles were also chambered for the 7.65 Mauser cartridge. Many of the M30 rifles had barrels with a very short shoulder or reinforcement section; that is, the shoulder contour of the barrel started a short distance from the receiver.

By 1939, the 30A and 30R were available only in 30-06 and again had a barrel band for anchoring the open rear sight. The forend was now made fuller and without the schnabel tip. All receivers were now being tapped for a receiver sight, and the 30S was now listed as the 30SL, 30SR or 30SX, depending on whether the rifle was furnished with a Lyman, Redfield or no rear

sight at all. The 25 Rem. caliber was also dropped in the Model 30S.

Model 30 and 30S barrels were usually marked thus, in two lines: REMINGTON ARMS CO., INC., REMINGTON ILION WORKS, ILION, N.Y. MADE IN U.S.A. Or: REMINGTON ARMS COMPANY, INC., SUCCESSOR TO REMINGTON ARMS U.M.C. CO. INC., REMINGTON ILION WORKS, N.Y. U.S.A.

The left side of the receiver ring may be marked thus, in two lines: MODEL 30/EXPRESS, and the right side thus, also in two lines: REMINGTON/TRADE MARK.

The serial number is stamped on the receiver ring, and the caliber designation is stamped on the breech end of the barrel.

I have no idea how many of these rifles were made, but they were fairly common in the 1930s. Most of these I've seen were in 30-06 or 257 Roberts caliber. I doubt very much if many were made in 30, 32 or 35 Rem. In the past, many of these rifles were rechambered. For example, the 25 Rem. rifles were often rechambered for the 250-3000 Savage or 257 Roberts, the 257 Roberts to the 25 Niedner (25-06) or to some wildcat 25 Magnum, the 30 Rem. to 300 Savage or 30-06, the 35 Rem. to 35 Whelen, and the 30-06 to the 300 H&H Magnum. In most of these rechamberings, some magazine and bolt-head alterations were also necessary to effect proper conversion.

Model 30 and 30S Remington rifles are not too common today, and collectors are beginning to take note of them. However, only rifles in entirely original and very good condition will have any present or future collector value. Those rifles that don't meet such conditions will continue to be bought, sold, traded and remodeled until they're ruined or worn out.

All Model 30 Remington rifles were discontinued by 1941, replaced by the Model 720 Remington.

The Remington Model 720

The M720 Remington rifle is not well known today. Introduced at the start of WWII, it was continuously listed until 1947, but was probably made in limited numbers the first year or so. It was, most likely, not available at all during the war years. As the 30S had been an improvement over the early M30, the 720 was an improved 30S. The "improvements" were noticeable and Remington advertised these to be: 1) Superior stock design of dense walnut having a fluted comb, full pistol grip, slimmer middle section, and semi-beavertail forend, with grip and forend checkered; 2) Guide rib on the bolt to prevent binding, for smoother and easier bolt operation; 3) Improved bolt handle shape; 4) Short, fast firing-pin travel; and 5) Quick-release floorplate.

Up to the time of this writing, I have yet to see a specimen of the Model 720 Remington rifle, so I can't describe action details, how the guide rib is made, etc. The receiver bridge is tapped to accept a receiver sight, but not for scope mount bases. Weaver Scopes lists detachable top-mount bases for the 720 (36 rear and 11 front), indicating that the bridge is of the same contour and height as that of the 721, 722 and 700 Remington rifles, which require the same rear base.

The main outward differences of the 720 over its predecessors are two: The bolt handle shank is straight, and the bridge is flatter and lower than the receiver ring.

Both features improve the looks of the action. The other readily seen changes are in the shape of the stock—its fluted comb



Remington Model 720 rifle—the finest of the Remington rifles based on the Model 1917 Enfield action (photo courtesy Remington Arms Co.).

and longer, fuller forend—which sets it apart from the 30S. Firing-pin travel was reduced, but only a very small amount. The standard trigger on the 720 was the same as on the late Model 30S, but an optional military double-stage trigger was available.

This, the last Remington rifle to be made on the basic 1917 Enfield action, was available in calibers 30-06, 257 Roberts and 270 Winchester. Three basic models were list-

ed: the 720A with 22" barrel, the 720S with 24" barrel, and the 720R with 20" barrel. All were available with open sights, or without the open rear sight but fitted with a Lyman, Redfield or Marble-Goss receiver sight, in which case the letter L, R or M followed the regular model designation.

According to *Remington Arms In American History*, by Alden Hatch, the barrel markings are as follows: **Remington Arms Co.,**

Inc., Ilion, N.Y. Made in U.S.A. Pat. No. 2,437,373 - 2,514,981 - other pending. The caliber is stamped on the left side of the breech section. Hatch also said the rifle was made in 300 H&H Magnum caliber.

The 720 Remington rifles are now collector's items, although they may not become really valuable until many years hence. One rifleman who had seen and handled the 720 called it the "Cadillac" of the Enfields.



Remington Models 721, 722, 725, 700, 600, 660, and 40-X

THE MODEL 721 Remington high-powered bolt-action rifle was introduced in 1948. In describing this new rifle and action in the March, 1948, issue of *American Rifleman*, the late Julian S. Hatcher flatly stated that it was by far the strongest and safest bolt action produced up to that time. Indeed it was! In this report, General Hatcher describes the torture tests to which the Model 721 was subjected. At the time the same tests were done on a high-numbered 1903 Springfield, 1917 Enfield and a military 1898 Mauser. The 721 was still going strong long after the Springfield, Mauser and Enfield gave up, in that order. Time has proven Hatcher to have been right, for in the more than forty-five years following his statement, Remington actions based on the Model 721 design are still considered by many firearms experts as being the safest, if not the strongest, actions made.

Most shooters are familiar with the 721 and 722 Remington rifles. The 721 was the "long" action (8.75" length), used for calibers 270, 280, 30-06 and 300 H&H Magnum. Of the several grades made, the lowest was the 721A. The 722 action was the "short" one (7.87" long), used for rifles in 222 (introduced 1950), 222 Magnum (1958), 244 (1955), 243 (1961), 257 Roberts, 300 Savage, and 308 (1957).

Markings

The 721 and 722 rifles have the name and model designation stamped on the left receiver wall, thusly:

REMINGTON
MODEL 721 (or 722)

The serial number is stamped on the left side of the receiver ring with the same number etched on the underside of the bolt body; the caliber designation is stamped on

the left side of the barrel; also stamped on the left side of the barrel, ahead of the rear sight, is:

REMINGTON ARMS CO. INC.
ILION, N.Y.
MADE IN U.S.A.
PATENTS PENDING

or

REMINGTON ARMS CO., INC.
ILION, N.Y.
MADE IN U.S.A.
PATENT NO. 2,473,373:
2,514,961 OTHERS PENDING

The Remington proof mark, the letters R.E.P. within an oval, and various inspector's marks, are stamped on the breech end of the barrel.

A Popular Rifle

The 721 and 722 rifles became very popular shortly after they were introduced. There were a number of reasons for this; not least was the fine reviews they got from gunwriters. Word got around quickly that this Remington action was very strong and safe. The price was also right for sales appeal; for example, in 1950, list price of the 722 was \$74.95, compared to the 70 Winchester standard grade at \$109.50. Of course, the 70s had some features the Remington lacked, but the difference in price favored Remington. I have always considered the 721 and 722 as excellent values for the money. In addition to the free and favorable publicity the Remingtons received, Remington's two new cartridges (222 and 244), which were first introduced in the 722, did more than anything else to popularize the rifle. Few cartridges became so instantly popular as the 222, and the 722 rifle gained the most from this. Hindsight

also indicates that if Remington had introduced the 244 cartridge with the same bullet weights and rifling twist as Winchester used with their 243 cartridge, and/or had chambered the 722 for the 243 immediately, the Remington rifle would have gained an even wider acceptance. I am not going to get into the 243 vs. 244 controversy here, but for reasons which are quite hard to understand, Remington was the loser in the 6mm cartridge race.

The Action

The 721 and 722 actions are alike except for length. The receiver is machined from round-bar stock of the highest quality steel. The recoil lug is a separate part, held between the receiver and the shoulder on the barrel when the barrel is threaded tightly into the receiver. The lug area is ample to hold the barrel and action from setting back in the stock from recoil.

The receiver, threaded at the front to accept the barrel shank, is precisely bored and milled to accept the bolt with its forward dual-opposed locking lugs. The approaches to the locking shoulders in the receiver ring are beveled, so that on turning the bolt handle down the bolt is forced forward a short distance. The round receiver has the same diameter its entire length. The top of the long bridge is machined nearly flat to reduce weight. Two holes are tapped into the top of the ring and bridge for scope mount bases. Two more holes are in the left side of the bridge for a receiver sight. The bridge is quite long, and the close machining of the inside of the receiver and the outside of the bolt, plus

(Above) Remington 722 rifle. It was a plain working man's rifle but a good one.

PART II: Commercial Rifles & Actions



Remington 722 action.

their well-finished, smooth surfaces, makes for a smooth-operating bolt, with a minimum of end wobble when the bolt is open. It also eliminates possible bolt binding when the bolt is operated. The right receiver wall is low enough to leave ample room for loading and unloading the magazine.

To prevent the bolt from binding, the right side of the bridge extends forward of the magazine-well opening, yet is back far enough so that the empty cases or loaded cartridges can be ejected properly. Because the bridge is so long, a square notch is milled in its top front for easy insertion of cartridges into the magazine. This notch is not a stripper clip guide, however.

The main part of the bolt body is a machined steel cylinder. The bolt head, with the locking lugs, is made as a separate part and then permanently brazed onto the bolt body. The two locking lugs are unlotted, unnotched and undrilled; in other words, they are solid. The very low-profile bolt handle, also made as a separate part, is then brazed to the rear of the bolt body. This brazing is so well done that the brazed lines are almost impossible to detect. Fabrication of the bolt in this manner in no way detracts from its appearance or affects its strength. The short rectangular-to-round stemmed bolt handle, ending in a solid round grasping ball, is low enough to clear the eyepiece of the lowest mounted scope. The right side of the tang is deeply notched for the base of the bolt handle, the bolt handle thus becoming the safety locking lug. Part of the bolt handle base also forms a

collar part way around the top of the bolt. This collar has an inclined surface which gives initial extraction power when the bolt handle is raised.

The quality of steel used in making the bolt and receiver (plus the proper heat-treatment given to these parts afterward), the heavy solid locking lugs and the bolt-handle safety lug produce a very strong action. Its strength is complemented by a breeching system which practically seals a cartridge in the chamber—making these actions about the safest ever constructed. The bolt extends about .150" ahead of the locking lugs, and the breech face of the barrel is recessed to receive it with a minimum of clearance around its circumference. Further, the face of the bolt head is recessed for the cartridge head. There is about .005" clearance between the front end of the bolt and the barrel when the bolt is locked. This is needed to prevent the bolt from binding and to facilitate obtaining correct headspace when the barrel is chambered.

The extractor is a thin C-type flat spring clip which has a lip pressed into its inside curve. It fits in a shallow groove cut into the inside of the rim which forms the bolt-face recess. The ejector, a spring-loaded plunger fitted into a hole along the perimeter of the bolt face recess, is held in place by a small cross-pin. The ejector prevents the extractor from turning in its recess. When a cartridge is fed from the magazine to the chamber by the bolt or if a cartridge is dropped into the chamber, on closing

the bolt, the extractor snaps over the cartridge rim and the ejector is depressed as the bolt is forced forward when the handle is lowered.

Although the extractor is small, and its lipped hook which engages the cartridge rim is narrow, it gets a good bite on the rim; it seldom fails to pull a fired cartridge from the chamber when the bolt handle is raised. When the bolt is pulled back, no matter how slowly, the spring-loaded ejector will flip the cases to the right clear of the rifle. Since the extractor is entirely within the bolt-head recess, there is no extractor cut in either the bolt head or face of the barrel to break the seal between bolt and barrel.

In the event of a cartridge head failure, it is unlikely any powder gases could escape from between the bolt and the barrel, but if any did it would be directed into the locking-lug recess in the receiver ring and escape through a vent hole in the right side of the receiver. Should any gases enter the firing-pin hole from a pierced primer, this gas would largely escape through a vent hole on the left side of the bolt head, being directed into the locking-lug recess and in the left locking-lug raceway.

The firing mechanism is a simple one. The very stiff coil mainspring is compressed over the lightweight one-piece firing pin between a shoulder on the pin and the bolt sleeve. The rear end of the firing pin extends through the bolt sleeve (listed as the "bolt plug" by the factory) where the firing-pin head is attached to it by a cross-pin. The bolt



Left-side view of the 722 action.

sleeve threads into the rear of the bolt. An extension on the firing-pin head extends forward through a slot in the bolt sleeve to contact the rear of the bolt. Here, there is a deep cocking-cam notch into which the firing-pin head can move when the rifle is fired. Then, it is forced back to cock the action when the bolt handle is raised. There is also a shallow notch into which the end of the firing-pin head rests when the bolt is opened, preventing the bolt sleeve from turning when the bolt is open as there is no separate bolt-sleeve lock. The extension on the firing-pin head also projects down into a raceway cut into the bottom of the receiver tang, so it can contact the sear lever to hold the firing pin back when the action is opened. Lock time is extremely fast, as the total firing pin travel is less than .300". The ignition is also very positive, and I have never heard of anyone complaining about misfires with these rifles.

The bolt-stop is a flat steel stamping fitted in a slot cut under the left locking-lug raceway, with its front end projecting into this raceway to contact the locking lug when the bolt is opened. Held in place and pivoting on a pin, it is tensioned by a small coil spring. The bolt-stop release is a bent spring-steel strip of metal sliding on the trigger and safety pivot pins on the left side of the trigger housing, and extends from the top inside of the trigger guard to the rear of the bolt-stop. Pushing it up pivots the bolt-stop down so the bolt can be removed from the action.

The trigger and safety mechanism are

housed in a stamped sheet-metal box attached to the underside of the receiver by the bolt-stop and sear pins. The sear is a thin piece of hardened metal positioned in the top right side of the trigger housing and in the trigger-housing opening in the receiver. It pivots on the sear pin in the front of the housing and is tensioned by a coil spring.

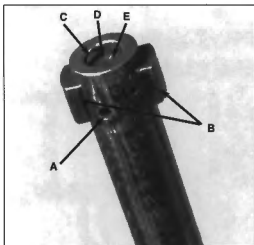
The trigger, positioned in the bottom of the housing, pivots on a pin. A hardened, carefully ground piece of metal called the trigger connector fits over the top front of the trigger. The top square edge of this piece, contacting the bottom of the sear to hold it up, releases it when the trigger is pulled. A set-screw, threaded into the front of the trigger housing and contacting the top of the trigger connector, can be adjusted to stop or limit trigger over-travel. Just below this screw is the trigger weight-of-pull adjustment screw, and over its end is the trigger spring. Turning this screw in or out puts more or less tension on the spring, varying the pull weight. Another screw threaded into the rear of the trigger housing adjusts the trigger-sear engagement. All three of these screws are normally adjusted at the factory for minimum trigger over-travel, minimum sear engagement to remove creep, and a trigger let-off of about 3.5 to 4 pounds, and then sealed. More on how to adjust the trigger later.

The safety, a bent steel stamping positioned largely on the right side of the trigger housing, pivots on a pin through the housing. It has a serrated button projecting upward along the right side of the receiver tang, conveniently

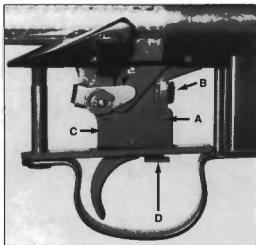
positioned for thumb operation. The front of the safety extends alongside the trigger housing; when the safety is pulled back, the front of the safety moves up to engage a notch in the rear of the bolt body to lock the bolt. The safety cam, another strip of metal similar to the sear, lies to the left of the sear and pivots on the sear pin.

A short arm, doubled back on the rear of the safety, reaches into the trigger housing under the safety cam. When the safety button is pulled back (which can be done only when the action is cocked), this arm causes the safety cam up, forcing the firing-pin head back so it is off of the sear. Thus, with the safety pulled back to the Safe position, the firing pin and bolt are locked. A small ball bearing lies in a hole in the side of the safety; a flat spring fastened on the safety pin tensions the ball to hold the safety in either the Safe (back) or Fire (forward) position.

The trigger guard bow and the magazine floorplate are formed from a single piece of heavy sheet metal. The top of the bow is enclosed by a narrow plate through which the trigger extends. Three guard screws through holes in the trigger guard/floorplate, threading into the receiver, hold the barrel and action securely in the stock. The front and rear guard screws are heavy, but the center one, in front of the bow, is lighter. The magazine box, of light sheet metal, is positioned between the receiver magazine-well opening and the floorplate. The cartridge guide lips are milled in the sides of the receiver-well opening. The ridged follower is also a sheet-metal stamp-



Remington 722 (222 Remington caliber) bolt head showing: (A) gas vent hole, (B) twin solid locking lugs, (C) extractor, (D) recessed bolt face, (E) ejector.



The 721/722 trigger mechanism, showing the location of: (A) weight-of-pull adjustment screw, (B) trigger-stop (over-travel) screw, (C) sear-engagement adjustment screw (see text for details). Arrow (D) points to bolt-stop release.

ing, while the follower spring is of the usual W-shape. Magazine boxes for 222 and 222 Magnum cartridges have a sheet-metal insert in the rear of the box to hold these shorter cartridges forward; a shorter follower and follower spring are also used, of course.

Good and Poor Features

For Remington to get into the centerfire bolt-action rifle market successfully, and stay there, they had to come up with a new and improved action design, and to hold its manufacturing cost down so it could be sold at a lower price than any of its competitors. They did just that with their 721 and 722 rifles. They were, and still are, truly reliable and accurate rifles. The action was well thought out and designed, the entire rifle well constructed. The barrel and action were as good, and in some ways better, than that of any other rifle on the market, while the rest of the rifle was made without frills to keep the cost down.

The 721/722 breeching system—the car-

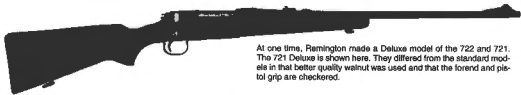
tridge head entirely recessed within the bolt face and the head of the bolt recessed in the breech face of the barrel—was the most noteworthy feature that made these actions safe. Making the receiver and bolt out of quality steel, and making the locking lugs large and solid, provided the strength for which these actions became noted. The simple firing mechanism, with its very fast and positive ignition, is another excellent feature. The bolt-stop is very good and so is the ejector.

Although made of steel stampings, the trigger and safety mechanisms have proven good and reliable, attested to by the fact that essentially the same mechanisms are used in the later 600 and 700 Remington rifles. A more simplified trigger mechanism might have been better, but I can remember repairing only one 722 trigger in the years I was in the gunsmithing business.

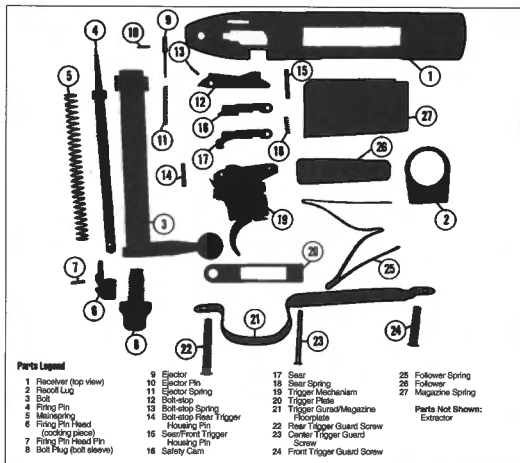
While some gunsmiths and shooters did not like the round-bottomed receiver and the separate recoil lug, I see nothing wrong

with the latter system. Locked between the receiver and barrel, it performs its function just as well as if it were part of the receiver, though I'd rather have it as a separate piece welded on to the receiver as in the Model 2000 Mauser. A round-bottomed receiver does tend to cause stock splitting if the guard screws are tightened too much, but the use of a glass-bedding compound in the stock takes care of this minor complaint.

Many shooters also dislike the stamped trigger guard/floorplate and follower, but they were necessary if Remington was to keep the price down. I never minded these stamped parts myself; the trigger guard/floorplate is heavy enough and is shaped so as to be both as rugged and as good looking as can be expected from a stamping. Not long after these rifles came out, demand for a hinged floorplate magazine induced Grif-fin & Howe to make such a guard/magazine for a number of years. Later Remington made a deluxe version of the 721/722, designated the 725, which was made with a hinged floorplate magazine. This magazine



At one time, Remington made a Deluxe model of the 722 and 721. The 721 Deluxe is shown here. They differed from the standard models in that better quality walnut was used and that the forend and pistol grip are checkered.



Remington Models 721 & 722 Actions

Dimensional Action Specifications

	M721	M722
Weight	43 oz.	40 oz.
Receiver length	8.750"	8.00"
Receiver ring dia.	1.360"	1.360"
Bolt dia.	.700"	.700"
Striker travel	.285"	.285"
Bolt travel	4.50"	4.00"
(300 H&H)	4.850"	
Guard-screw spacing	7.25"	6.50"
Magazine length	3.350"	2.85"
(Magnum)	3.700"	
Bolt face recess:		
Depth	.145"	
Diameter (222 size)	.365"	
(30-06)	.480"	
(Magnum)	.540"	

General Specifications

Type	Turnbolt repeater.
Receiver	Machined from bar-stock steel. One-piece construction except recoil lug is a separate part fitted between the barrel and receiver. Non-slotted bridge. Tapped for scope mounts and receiver sight.
Bolt	Three-piece construction and low-profile handle brazed on the rear of the body, and the bolt head with dual-opposed locking lugs brazed into the front end. Base of handle acts as safety lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column four-shot box type (three-shot for magnum cartridges.) One-piece stamped steel trigger guard and floorplate.
Bolt stop	Pivoting lever type, stops bolt by contacting left locking lug. Release plunger located within guard.
Trigger	Single-stage, adjustable for weight-of-pull, take-up and over-travel.
Safety	Pivoting side tang type, locks striker and bolt.
Extractor	Rotating "C" clip spring type, built within the bolt face.
Ejector	Plunger type built within the bolt head.

PART II: Commercial Rifles & Actions

could be installed in the 721/722 with a minimum of trouble.

There are a couple of things this action does not have which I think it should. There is one gas-vent hole in the bolt head and one through the right side of the receiver ring, but when the action is closed and locked, the vent hole in the bolt is toward the left, where there is no hole in the receiver. I'd like a gas-vent hole through the left of the receiver, in line with the hole in the bolt. I would also have insisted that the bolt sleeve have a small flange on its left side to cover the locking-lug raceway, even with the additional vent hole in the left side of the ring.

I never really liked the very small spring clip extractor, although I never experienced any trouble with it in any of the 721s and 722s I owned or fired. I have had customers bring these rifles in with a fired case stuck in the chamber and chunks bit out of the rim by the extractor when the bolt was forced open. In most instances, it was a rusted chamber which caused the case to stick, and few extractors in such situations would have pulled the cases out. The point I want to make, however, is that while the bolt head is recessed to fully enclose the head of the cartridge case, the rim of the case is not actually supported in any way. This is because the inside of the rim of the bolt face recess is cut out for the extractor, and cut out deeper than the thickness of the extractor, so that there is enough room for the extractor to move as it snaps over a case rim on closing the bolt. With this type of extractor design, there is no way in which the cartridge rim can be supported.

I recall two instances that illustrate what this means. I had fitted a heavy Hart stainless steel barrel on a 722 action for a friend of mine, chambering it for the 222 Remington cartridge. My friend then sleeved the action and built a benchrest rifle. He was very fussy and a very careful handloader, weighing the powder charges out and putting each charge in a small glass vial so he could quickly and easily reload cases during a match. His most accurate load was not a hot one, and everything went along normally. After firing a couple of hundred rounds of this load, which gave less than 1/2 minute-of-angle accuracy, one case let go; a lot of powder gases escaped through the rear of the action, spewing his face with gas and brass. Opening the bolt extracted the case easily enough, but it would not eject—nor could the case be removed from the bolt head. He tried twisting the case out with a pair of pliers, and when this didn't work, he used a vise. Failing with this, he brought the bolt to me; I had to use a lathe and bor-

ing tool to turn the head of the case out of the bolt face recess. Expansion of the case against the extractor had broken it, but other than this and the trouble involved, the action was not harmed.

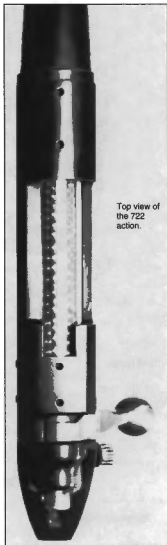
In the second incident, the shooter claimed that the cartridge which put his 722 out of order was a factory load. Again it was a 222, and he told me it was mighty fortunate he'd been wearing shooting glasses. The trouble may have been due to a faulty case, but the head of that case had expanded so tightly into the extractor groove that the entire rim around the recess was expanded, so that he could hardly turn the bolt and open it. A gunsmith had bored out the remains of the case head, but the head of the bolt had expanded to such a degree that a new extractor would not fit properly. In this instance, had the bolt head not been recessed within the face of the barrel, the rim of the bolt head might have split. The owner of the rifle then returned it to the factory, where they fitted a new bolt at no charge.

I have never observed or heard of this happening with any of the larger calibers. Apparently the larger cases are stronger and can take more pressure. It is also a good thing that the heads of the belted magnum cases are strong and seldom expand, for in the 721 there is very little metal in the rim of the bolt-head recess.

A mechanical aspect of this action that I've always been skeptical about is the fastening of the cocking piece to the firing pin by a single small pin. It must be OK, though, for I've never seen or heard of this pin shearing. I've never hesitated to snap or dry fire any of the many centerfire bolt-action rifles I have owned, including these Remingtons, and I have yet to see that this has done any harm.

The 722 as a Benchrest Action

Almost immediately after the 222 Remington cartridge was introduced, it became a favorite with the "benchresters"—target shooters who pit rifles and ammunition against their competitor's by firing from a solid bench and holding the rifles on a rest. This little cartridge soon topped many previous records. These shooters soon discovered, too, that the 722 action was an ideal one on which to build a benchrest rifle. So popular were these actions that, for a few years, Remington would sell separate 722 actions to qualified gunsmiths, who would accept the responsibility of fitting a barrel to them. Many benchrest target shooters were amateur or professional gunsmiths, and they soon found that to get the best out of this action a "sleeve" was needed. This could readily be done with the 722 action because of its round receiver. The sleeve,



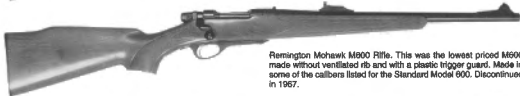
Top view of the 722 action.

usually made from a piece of seamless steel tubing or heavy-walled steel pipe up to a foot or so in length, was bored or reamed out so that the 722 receiver was a snug fit inside. The outside of the receiver and the inside of the sleeve were then tinned with solder, and the receiver, up to the bolt-handle notch, was sweated inside one end of the sleeve. At some point, of course, a slot was cut into the sleeve for the trigger housing, and an oblong opening made for the loading port. The barrel was made a bit

PART II: Commercial Rifles & Actions



Remington Standard Model 600 Carbine. This model was made in calibers 222, 6mm, 243 Win., 308 Win. and 35 Rem. The 18.5" barrel has a ventilated nylon rib.



Remington Mohawk M600 Rifle. This was the lowest priced M600 made without ventilated rib and with a plastic trigger guard. Made in some of the calibers listed for the Standard Model 600. Discontinued in 1967.



Remington Model 600 Magnum Carbine. Similar to the standard Model 600, but made with laminated walnut and beech stock. In calibers 6.5mm Rem. Mag. and 350 Rem. Mag. Weight about 6.5 lbs. Made 1965-67.



Remington Model 680 Magnum Rifle. Same as Model 600 Magnum except has 20" barrel. Made from 1968 to 1971.

done with caution as the mainspring is very strong. Reassemble in reverse order. To aid in reassembling, drill a $\frac{1}{16}$ " hole in the side of the workbench in which to insert the firing-pin tip. Finally push the bolt sleeve over the firing pin to compress the mainspring and slip on the firing-pin head, using the drift punch to hold the head in place when the holes are aligned. Then drive in the cross-pin, which will push the punch out. Remove the ejector by driving out the small cross-pin from the bolt.

A special bent, round-pointed tweezer is required to remove the extractor without damaging it. However, a new extractor can be installed without the use of this tool by carefully pinching the ends of the extractor together until it can be pressed into the bolt-face recess. Be sure to insert the extractor with the sloping side of the extractor hook toward the front.

Remove the barrel and action from the stock by turning out the rear, center and front guard screws; lift off the guard, removing

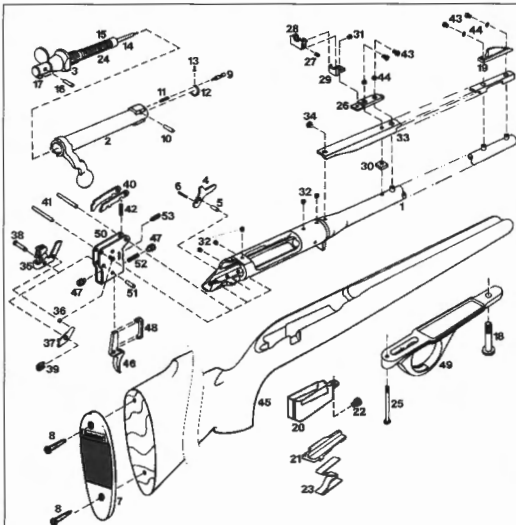
follower spring, follower and trigger plate; then lift barrel and action from the stock. The magazine box, which usually remains in the receiver, can then be pulled free. On doing this, note the position of the box in the receiver so that it can be returned in that position. If the magazine box has a spacer, also note its position.

To remove the trigger mechanism and disassemble it, proceed as follows: (Caution—this trigger mechanism should not be disassembled unless it has to be repaired or cleaned, and then only if you know how to go about it.) Disassembly should be done on a clean workbench, preferably on a white cloth or in a tray; as each part is removed it should be laid down in orderly sequence, so it can be replaced in its proper order and position. Drive out the rear trigger-housing pin, which is also the bolt-stop pin; drop down the rear of the trigger housing, and remove the bolt-stop and bolt-stop spring; drive out the front trigger-housing pin, which is also the sear pin, and the entire trig-

ger mechanism can be removed from the receiver.

Lift out the sear, safety cam and the sear spring. Push off the safety snap washer from the safety pin and remove the safety-detent spring, safety-detent ball, safety-pivot pin, bolt-stop release and the safety. Be careful not to lose the safety-detent ball bearing. Remove the front and rear trigger-adjustment screws, trigger spring and trigger-stop screw. Drive out the trigger pin and remove the trigger and trigger connector.

To reassemble: Assemble the trigger connector to the trigger; insert the trigger in the housing, and drive in the trigger pin until it is even with the right side of the trigger housing; assemble the trigger spring, front trigger-adjustment screw, rear trigger-adjustment screw and trigger-stop screw (See the previously mentioned comments on trigger adjustments for properly adjusting these screws after the trigger mechanism has been completely assembled and fitted to the receiver.); assemble the safety, bolt-stop



Parts Legend

- 1 Barrel
- 2 Bolt Assembly
- 3 Bolt Plug
- 4 Bolt Stop
- 5 Bolt Stop Pin
- 6 Bolt Stop Spring
- 7 Buttplate
- 8 Buttplate Screws
- 9 Ejector
- 10 Ejector Pin
- 11 Ejector Spring
- 12 Extractor
- 13 Extractor Rivet

- 14 Firing Pin
- 15 Firing Pin Assembly
- 16 Firing Pin Cross Pin
- 17 Firing Pin Head
- 18 Front Guard Screw
- 19 Front Sight Assembly
- 20 Magazine
- 21 Magazine Follower
- 22 Magazine Housing Screw
- 23 Magazine Spring
- 24 Main Spring
- 25 Rear Guard Screw
- 26 Rear Sight Base
- 27 Rear Sight Elevation Screw

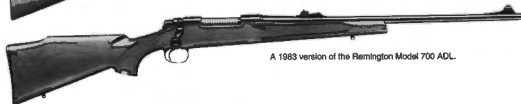
- 28 Rear Sight Eye Piece
- 29 Rear Sight Leaf
- 30 Rear Sight Nut
- 31 Rear Sight Windage Screw
- 32 Receiver Plug Screws
- 33 Rib
- 34 Rib Screw
- 35 Safety Assembly
- 36 Safety Detent Ball
- 37 Safety Detent Spring
- 38 Safety Pivot Pin
- 39 Safety Snap Washer
- 40 Safety Cam
- 41 Sear Pins

- 42 Sear Spring
- 43 Sight Screws
- 44 Sight Washers
- 45 Stock
- 46 Trigger
- 47 Trigger Adjusting Screws
- 48 Trigger Connector
- 49 Trigger Guard
- 50 Trigger Housing
- 51 Trigger Pin
- 52 Trigger Spring
- 53 Trigger Stop Screw

PART II: Commercial Rifles & Actions



Pre-1962 Remington M700 ADL.



A 1963 version of the Remington Model 700 ADL.



Remington M700 BDL, left-hand.



Remington M700 Classic.

release, safety-pivot pin, safety-detent ball, safety-detent spring, and safety-pin snap washer; assemble the sear spring, sear and safety cam; assemble trigger housing to the receiver with the sear pin; insert the bolt-stop spring and bolt-stop in the receiver and drive the bolt-stop pin in part way; raise up the rear end of the trigger housing until the hole aligns, compress the sear and safety cam, and drive in the bolt-stop pin.

Reassemble the rest of the rifle in reverse order. Turn the front and rear guard screws very tight. If the bolt does not close easily after the rifle has been disassembled and reassembled a few times, and/or if the front guard screw has been tightened over a period of time, this may indicate that the end of this screw is projecting into the receiver and contacting the lower locking lug. In this case, shorten the front guard screw as required.

The barrel is threaded very tightly into the receiver, and a special action wrench, as well as a barrel vise, are needed to remove it without damaging the receiver and barrel.

Conclusion

The Remington 721, 722, the deluxe version of these rifles, and the 725 were all discontinued in 1962. A great many of these rifles were made. In years to come, many will be offered for sale on the secondhand gun market, and they will become an ever ready source of actions for the amateur and professional gunsmith. If you want a 721 or 722 action, don't waste time looking for a separate action; just look for a used rifle and then strip the rifle for the action. As I have mentioned before in this book, it is usually possible to buy a complete rifle for only a little more than the cost of a separate action alone.

The Successors

When the 721, 722 and 725 were discontinued in 1962, Remington brought out the 700 series of high-powered rifles. Although the 700s have changed somewhat since that time, their actions, except for the trigger guard and magazine, are still almost identical to the original 721/722 actions. The 700s are made

in two different lengths, for medium- and long-length cartridges.

The 700 ADL is made with a blind magazine box, the box inletted into the stock. A black alloy or nylon trigger guard is used, but there is no magazine floorplate because the magazine box is within the stock. The 700 BDL and a number of other 700 models have a combination trigger guard/magazine box made of an alloy which has a hinged floorplate, with the sheet-metal magazine box fitted between the guard and the receiver. There are a number of other 700 models made with all stamped steel trigger guards and floorplates and other minor changes. Some of these will be described in the captions of some of the rifles illustrated here. Other than this, the 700 actions are just like the earlier 721/722s, and to give a detailed description of the 700 actions would be to repeat what I have already written about the 721 and 722.

Since 1962, Remington has introduced other rifles and a pistol built on a modified 722 action. They were modified in such a



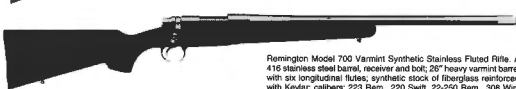
Remington M700 Custom Rifle.



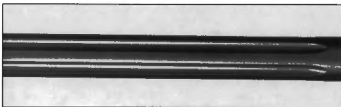
Remington M700 Safari Rifle.



Remington M700 Varmint Rifle.



Remington Model 700 Varmint Synthetic Stainless Fluted Rifle. A 416 stainless steel barrel, receiver and bolt; 26" heavy varmint barrel with six longitudinal flutes; synthetic stock of fiberglass reinforced with Kevlar; calibers: 223 Rem., 220 Swift, 22-250 Rem., 308 Win. Weight about 9 lbs. Introduced 1992.



The muzzle end of the M700 Varmint Synthetic Stainless Fluted barrel clearly showing two of the six flutes. These flutes lighten the barrel without affecting the stability.

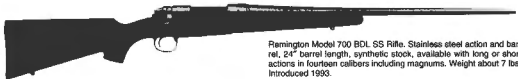


This photo shows where the flutes begin at the breech end of the barrel.

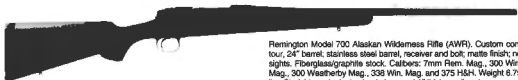
PART II: Commercial Rifles & Actions



Remington 700 Varmint Synthetic Rifle. Similar to the Remington M700 V Stainless Steel. In calibers 220 Swift, 223, 22-250 and 308. Weight about 9 lbs. Introduced 1992.



Remington Model 700 BDL SS Rifle. Stainless steel action and barrel, 24" barrel length, synthetic stock, available with long or short actions in fourteen calibers including magnums. Weight about 7 lbs. Introduced 1993.



Remington Model 700 Alaskan Wilderness Rifle (AWR). Custom contour, 24" barrel; stainless steel barrel, receiver and bolt; matte finish; no sights. Fiberglass/graphite stock. Calibers: 7mm Rem. Mag., 300 Win. Mag., 300 Weatherby Mag., 338 Win. Mag. and 375 H&H. Weight 8.75 lbs. Straight comb stock, cheekpiece and 1" thick recoil pad.



Remington Model 700 African Plains Rifle (APR). Magnum contoured carbon steel 26" barrel, blued satin-finished barrel; laminated hardwood stock, straight comb with cheekpiece, 1" recoil pad; action glass-bedded in stock. Weight about 7.75 lbs. Introduced 1993.

way that I sometimes described it as a "push-in-from-behind" carbine. On this model, the bolt handle is dog-leg shaped like the P-17 Enfield but in reverse. In addition, the trigger mechanism is placed further forward, about the same amount as the bolt handle knob was placed forward. Anyway, this carbine looked to me like it was pushed in from behind. These include the 600 and 660 carbines, and the XP-100 single-shot pistol. All are based on the basic 722 receiver, bolt and trigger mechanism.

Newer 700 Models

The following descriptions show some of the many different models of the 700 Remington. Following that are some of the newer 700 models listed in the 1994 Remington catalog.

Pre-1982 Model 700 ADL—This is the lowest priced M700. Impressed checkering in walnut stock, 22" barrel in some calibers, 24"

for others. The current listing of calibers is: 222, 22-250, 243, 6mm, 25-06, 270, 7mm Express, 308 and 30-06.

Model 700 ADL—Introduced in 1983, about same as pre-1982 model except stock has cut checkering, semi-gloss finish, detachable sling swivel studs, smooth bolt knob, and in calibers 222, 22-250, 6mm, 243, 25-06, 270, 308, 30-06 and 7mm Magnum.

Model 700 BDL—Walnut stock with skipline checkering, black forend tip and pistol grip cap and white spacers. Raised comb and cheekpiece, 22" or 24" barrel depending on caliber with hooded ramp front sight and adjustable rear sight, and hinged floorplate. Calibers same as for the new ADL model plus 17 Remington, 7mm-08, 300 Magnum and 8mm Rem. Magnum. Right- or left-hand models. Left-hand in 270 and 30-06 only.

Model 700 Classic—Similar to the BDL except has straight comb stock, 24-line cut

checkering and rubber buttpad (recoil pad on 7mm Magnum). Calibers are 22-250, 243, 6mm, 270, 30-06 and 7mm Magnum. Limited production in 257 Roberts, 7x57mm and 300 H&H Mag. Chambering in 250-3000 announced in 1984.

Model 700 Custom—This is a special-order, custom-made Model 700 available with a number of options. Choice of calibers, 20", 22" or 24" hand lapped barrel, with or without sights, jeweled bolt, with or without hinged magazine floorplate, fancy hand checkered walnut stock with rosewood forend tip and grip cap.

Model 700 Safari—Same as M700 BDL except that stock has an oil finish, is hand checkered with recoil pad, and in 375 H&H Magnum and 458 Magnum calibers only.

Model 700 Varmint—Same as M700 BDL except has 24" heavy barrel, no sights, slightly fuller stock and in calibers 222, 223, 22-250, 243, 6mm, 7mm-08 and 308.



Remington Model 40-XC National Match Course Rifle.



Remington Model 40-XBBR Benchrest Match Rifle.

The 40-X Series

Remington also makes three centerfire target rifles based on the M700 action, or rather on a modification of this action. They are:

Model 40-XC National Match Course—Made in 308 (7.62 NATO) caliber only. This is a special-order target rifle for both slow- and rapid-fire National Match courses. It has a 23.25" heavy stainless steel barrel, clip loading slot for rapid loading of the magazine, and special anti-bind feature for the receiver and bolt. Weight is 10 pounds without sights.

Model 40-XBBR Benchrest Match Rifle—Made especially for benchrest target shooters, this is a single shot with a solid bottomed receiver. The heavy stainless steel barrel of 20" or 26" length comes in the following calibers: 222, 223, 243, 6mm, 22 BR Rem., 6mmx47, 6mm BR and 308 (7.62 NATO).

Model 40-XB Rangemaster Target—A single shot target rifle with heavy 27.25" stainless steel barrel in calibers 222, 223, 243, 6mm, 25-06, 7mm Magnum, 308, 30-06, 30-338 (30 Rem. Magnum), 300 Win. Magnum, 308 and 30-06.

Serial Number Notes

Dick Dietz of Remington Arms supplied the following serial numbering information on the Remington rifles listed below. The serial numbers given are the starting numbers for these models.

Model 720	40,000
Model 721 and 722	1,100
Model 725	700,000
Model 600	1,000
Model 660	6,200,000

This information may interest collectors seeking low serial numbered models of these rifles.



BILL RUGER IS a well-known modern gun designer whose creations include the Ruger 22 Automatic pistol, the Single Six and Blackhawk single-action revolvers, the Model 10/22 22 automatic rifle, the Ruger 44 Magnum Carbine and the Number 1 single shot rifle. All are or were successful, and all are currently manufactured in large numbers by the firm he headed: Sturm, Ruger & Co., Southport, Conn. 06490. No doubt that his most popular firearm is a very modernized Mauser-type turnbolt centerfire action, around which his firm is building fine "classic" bolt-action sporting rifles, like those originally popularized by Stewart Edward White and E.C. Crossman in the early days of the '03 Springfield. The Ruger bolt-action rifle is the Model 77, and without question it will become a leading number in the ever-growing Ruger lineup.

The Model 77 Ruger Rifle

Introduced in 1968, the M77 Ruger rifle was initially offered in one grade and a number of popular calibers. Weighing about 6.5 pounds, the M77 has a nicely contoured 22" sporter-weight barrel, and a classic-patterned American walnut stock that is hand checkered and nicely finished. The stock carries a rubber buttpad, a pistol grip cap containing the Ruger emblem, and sling swivel stud. From the beginning, all M77 rifles were furnished with Ruger scope rings, which fitted the integral bases machined on the receiver ring and bridge. Ruger also made some models with a round receiver top, drilled and tapped for regular scope mount bases.

The line was quickly expanded to include a short and a long action. The short action could have been better called a medium-length action and the long action was soon called the magnum action. In time the Ruger line expanded to include new models and calibers such as the Model 77V Varminter, the 77M Magnum in most of the magnum calibers, the 77 International with

full-length forend, M77 Ultra Light and M77 Express. By the time you read this all these models will be dropped and replaced by new models on an improved action called the Ruger Model 77 Mark II. You can read about these Mark II models in the following chapter. Someone has already written a book on Ruger handguns and a book on the Ruger No. 1 single shot rifle, and someone is bound to write a book on Ruger turnbolt rifles.

The 77 Ruger has received many rave reviews from most of the gun authorities and editors since its introduction. Praised are the excellent lines, balance and "feel" of the rifle, and its fine handling qualities. The trim and unadorned classic stock is given much praise. Everyone remarked upon the exceptionally fine accuracy of their test rifles. Few reporters found any fault with the rifle, or desired any changes to be made on it or anything added or removed. As for me, I think the Ruger 77 is quite a rifle, but the purpose of this book is not to put down my evaluation of any rifle, just to discuss, describe and evaluate the action.

The Original Model 77 Action

Just as Bill Ruger is a modern gun designer, so is he a proponent of the most modern manufacturing methods and techniques. His aim is to produce the best possible sporting firearms, of superior design, at the lowest possible cost, yet without sacrificing strength, reliability and accuracy. This he has done. Therefore, one of the manufacturing methods he has adopted is the fabricating of the major steel action parts by the investment casting process. This process is too complicated to describe here, but the net result is that many parts can be cast to extremely close tolerances, with only a minimum amount of machining and polishing needed to complete each casting. The process also allows the finest steel alloys to be used, thus the parts are made of the best steels for strength and durability. Before or

after finishing, the steel investment castings can be heat treated as required, the same as if the individual parts were machined from solid stock. To produce the investment castings, Ruger built a new facility in New Hampshire.

Castings are generally regarded with suspicion by shooters, as the word "casting" probably reminds them of cast iron or some other form of cheap casting. Years ago the making of precision castings of a quality alloy steel was considered about as impossible as taking a walk on the moon—we know better now! Parts of the Ruger 77 action which are made from investment castings include the receiver, bolt and extractor, all of chrome-molybdenum steel (AISI 4140), with each part properly heat treated. Other small steel action parts are also investment castings, including the scope-mount rings. The only non-steel parts are the trigger guard and floorplate, both made of a lightweight alloy.

The 77 action has several unusual and noteworthy design and construction features found in no other turnbolt centerfire action. This includes the receiver which, unlike most such actions, is slab-sided. That is, the receiver sides are flat, and the effect is pleasing. The receiver bottom is also flat, although the flats are not in the same plane. The receiver ring bottom is entirely flat except for the area taken up by the recoil lug. This affords a large "bottoming" area for the receiver against the stock, an area which, if properly bedded, contributes to the accuracy of the finished rifle. The recoil lug is ample in depth and width to prevent set-back of the barrel and action in the stock from recoil.

To the rear of the receiver-ring flat the bottom plane of the receiver moves up about .250", with the magazine well opening in it. Extra-wide guide lips on each side

(Above) Standard Ruger Model 77 short-action rifle with open sights.



Ruger Model 77 action, made in two lengths.

of this well hold the cartridges in the magazine, guiding them into the chamber as the bolt is closed. A long loading-guide ramp, in the front of the well, leads over the bottom locking-lug shoulder to guide the cartridges out of the magazine and upward into the chamber.

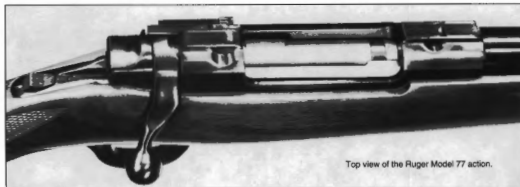
The receiver ring is about 1.725" long. The loading and ejection port, between the ring and the bridge, is about 2.750" long; the bridge length is about 1.00". The top of the bridge is about .125" lower than the ring top, and on each there is an integral flat-topped scope-mounting base. In the middle of each side of these bases there is a circular notch. The special Ruger-made scope-mount rings are made to clamp very securely on to these bases. To prevent the mount rings from sliding on the bases from recoil, a small projection, integral with and rising from each ring, fits into a matching notch cut into the top of

the bases. The Ruger mounts, very rugged indeed, are readily detachable.

The first Model 77 actions were made only in one length and with a right-hand bolt. The left receiver wall is about .775" high, but though it is channeled out to form the left locking-lug raceway, it is quite heavy and rigid. The receiver wall is unlike most other centerfire turnbolt actions, which have the right wall no higher than the bottom of the right locking-lug raceway. The right wall on the Ruger action extends about .250" higher than this. The extra ridge of metal adds greatly to the strength and rigidity of the receiver. The Savage 110 receiver is made the same way.

The 77 bolt-stop is also noteworthy. It is of the 98 Mauser type, in that it is attached to the left rear of the receiver, has a projection extending into the left locking-lug raceway that halts the bolt travel by contacting the left

locking lug, and that it is swung outward to release the bolt. It is shaped like the 98 Mauser bolt-stop, but is far simpler and more rugged. It is a small rectangular block of steel with a large oblong hole through its rear end. Fitted into this hole is a heavy screw and bushing, with the screw threaded into the receiver. In another hole, lengthwise through the bolt-stop, a plunger and a very stiff coil spring are fitted. Held in place by a small pin through the front of the bolt-stop, the plunger contacts the bolt-stop screw and bushing, providing the tension needed to hold the bolt-stop forward, against the receiver; it also allows the front of the bolt-stop to be swung away from the receiver to remove the bolt. While the spring holds the bolt-stop forward, the oblong hole allows the bolt-stop to move back a slight amount against spring tension. This provides a buffer or shock absorber to the bolt when it is



Top view of the Ruger Model 77 action.

PART II: Commercial Rifles & Actions

opened and drawn back. This lessens the abrupt shock when the bolt is halted, and may help the shooter in speedy operation of the bolt by starting it forward again after it is stopped.

The 77 bolt is of one-piece construction, the bolt handle made as an integral part. Dual-opposed forward locking lugs, engaging shoulders inside the receiver ring, hold the bolt locked in the receiver. Both locking lugs are solid. The left (upper) locking lug, larger than the right one, extends to the forward edge of the bolt, forming part of the rim of the bolt face recess.

The extractor, a long one-piece Mauser type, is attached to the bolt by a collar, which fits into a groove around the bolt body. The extractor doesn't rotate with the bolt. Longitudinal movement of the extractor is prevented by a lip, under the front end of the extractor, engaging a groove cut part way round the bolt head. The well-beveled extractor hook slips easily over a chambered cartridge rim on closing the bolt.

The bolt head is recessed for the head of the cartridge. About half of this recess is .120" deep, while the other half (over which the extractor hook extends) is only about .030" deep. Thus, unlike the case with 98 Mauser and pre-'64 Winchester 70 bolts, the cartridges are fed into the chamber ahead of the bolt and extractor, and double loading is possible if the bolt handle is not turned down after a cartridge is chambered.

The ejector, a spring-loaded plunger in the bolt face, is held in place by a cross pin.

The bolt handle has a very low profile to clear the eyepiece of a low-mounted scope. The side of the receiver is deeply notched for the heavy base of the bolt handle, and this forms the safety lug. The flat, but tapered, stem of the bolt handle angles sharply back to



A pair of 1" split-type scope mount rings are standard equipment with the Model 77 Ruger, included in the price of the rifles and barreled actions. Designed and made by Ruger, they clamp securely on the integral bases milled into the top of the receiver ring and bridge.

place the grasping ball within easy reach of the shooter's hand. The grasping ball is neither round nor pear shaped—it has a shape all its own. While this grasping ball may be satisfactory generally, I don't like the sharp top-rear corner of the stem, or its sharp rearward angle. Not long after the rifle's introduction, this bolt handle was replaced by a more conventional one with a round tapered shank and a rounded grasping ball.

An angled surface on the base of the bolt handle meets a matching surface on the left rear of the receiver bridge, and gives the initial cumming power to the extractor as the bolt handle is raised. Angled corners on the approaches of the locking-lug shoulders provide the power to force the bolt entirely forward when the bolt handle is lowered.

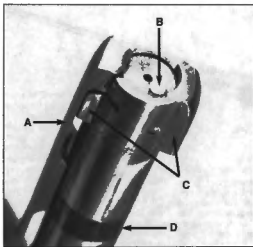
A short projection on the outside center of the 77 bolt, which they call the bolt guide, is not unlike the guide on the pre-'64 Winchester 70 bolt. On fully raising the bolt handle, the edge of this guide contacts the lower edge of the left locking-lug raceway, stopping further rotation of the bolt. Then, as the bolt is opened, it slides along the raceway until it is out of the receiver entirely. However, this bolt guide does little to guide the bolt, and does nothing when the bolt is fully opened.

The bolt is drilled from the rear for the firing mechanism; the latter consists of bolt sleeve, one-piece firing pin, cocking piece and coil mainspring. The cocking piece fits into the rear of the bolt sleeve; the firing pin fits tightly into the cocking piece, secured by a heavy pin. The rear end of the cocking piece can be seen and felt at all times to determine whether the action is cocked or not. There is a deep cocking cam notch on the rear of the bolt into which the nose of the cocking piece engages, and on opening the bolt the striker is cocked. When the bolt is open, the nose of the cocking piece rests in a shallow notch on the rear of the bolt, which prevents the bolt sleeve from being easily turned when the bolt is open. Striker travel is very short and fast, which is always desirable.

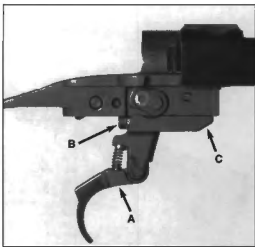
Ruger has made this a very safe action by providing means for powder gases to escape harmlessly out of the action in the event of a



Left-side view of the Ruger Model 77 action, opened. Note the receiver markings and angled front guard screw.



Ruger Model 77 bolt head showing: (A) extractor, (B) ejector, (C) dual-opposed locking lugs, (D) extractor collar.



Ruger Model 77 trigger mechanism showing: (A) location of weight-of-pull adjustment screw, (B) sear-engagement adjustment screw, (C) over-travel adjustment screw.

ruptured case head or pierced primer. The vent hole through the right side of the receiver ring, opposite the extractor hook, should take care of most of the powder gases resulting from a casehead failure. One large round hole and two long slots in the bolt body, directed downward into the magazine box, should take care of gases entering the bolt body through the firing-pin hole. There is little chance that any gases could ever escape back through the bolt sleeve. If any gases got into the left locking-lug raceway they would be deflected outward by the flange on the left side of the bolt sleeve. I think Ruger's idea of having vent holes in the bolt directing gases

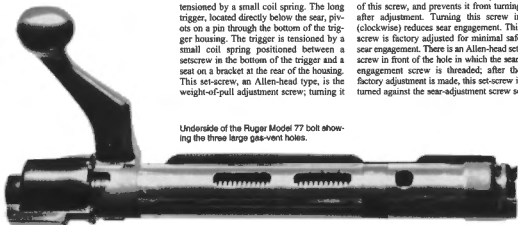
downward into the magazine is better than having them open into the left locking-lug raceway.

The simple trigger mechanism is fully adjustable for weight of pull, take-up and over-travel. The weight-of-pull adjustment set-screw can be adjusted without removing the barrel and action from the stock (see illustration). The take-up and over-travel screws are properly adjusted at the factory, so there is no need to adjust them further.

The trigger mechanism is contained in a steel housing, which is fitted in the bottom of the receiver and held in place by a rolled cross pin. The sear pivots on a pin through walls in the bottom of the receiver, and is tensioned by a small coil spring. The long trigger, located directly below the sear, pivots on a pin through the bottom of the trigger housing. The trigger is tensioned by a small coil spring positioned between a setscrew in the bottom of the trigger and a seat on a bracket at the rear of the housing. This set-screw, an Allen-head type, is the weight-of-pull adjustment screw; turning it

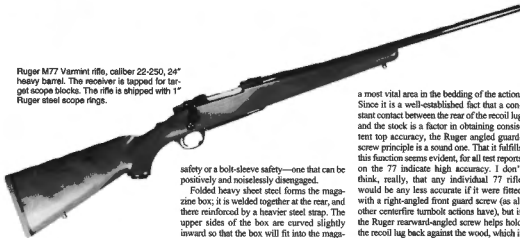
counterclockwise reduces the weight of pull to as light as two pounds. The screw can be reached with a bent Allen wrench through the trigger guard bow.

The top part of the trigger is in two parts; the front part or arm engages the safety, the rear arm engages the sear. This rear arm is quite thin and spring tempered. The top of it is honed square and smooth where it contacts a similar surface on the bottom of the sear. There is a hole through this sear arm for a slotted-head adjustment screw, which threads into the safety arm. The bottom of this screw head is notched to match a slight ridge across the edges of the hole in the sear arm; this provides a sort of click effect for the adjustment of this screw, and prevents it from turning after adjustment. Turning this screw in (clockwise) reduces sear engagement. This screw is factory adjusted for minimal safe sear engagement. There is an Allen-head set-screw in front of the hole in which the sear-engagement screw is threaded; after the factory adjustment is made, this set-screw is turned against the sear-adjustment screw so



Underside of the Ruger Model 77 bolt showing the three large gas-vent holes.

Ruger M77 Varmint rifle, caliber 22-250, 24" heavy barrel. The receiver is tapped for target scope blocks. The rifle is shipped with 1" Ruger steel scope rings.



that it cannot be turned in further, as doing so to decrease rear engagement would leave the action unsafe. A hole in the front of the housing, located directly in front of this locking set-screw, is the Allen-head trigger over-travel adjustment screw. It is also correctly adjusted at the factory. This over-travel, or trigger-stop, screw is normally adjusted as follows: with the bolt closed and the striker down, turn the set-screw in as far as it will go, then back it off about 1/4-turn.

The 77 has a true sliding tang safety. The receiver tang is made long enough, and sloped, so that a shotgun-type safety button can be positioned in it. The rotary safety shaft (or lock) is located in a hole through the walls in the bottom of the receiver. On the left side of this safety shaft a lever is riveted. A piece of bent wire connects the manual safety button with this lever, so that sliding the button back and forth rotates the safety shaft. A small looped-wire spring, hitched to the lever, provides the On and Off tension to the safety. Another lever is attached to the right side of the safety shaft, and when the safety button is pulled back, the end of this lever rotates up into a slot in the receiver, engaging a notch in the bolt to lock it. The center portion of the safety shaft has a flat spot where it fits between forked arms on top of the trigger. The trigger can only be released when the flat side is aligned with the rear fork, but is locked when the safety shaft is rotated 1/4-turn. Design and construction of the various trigger and safety parts are all good, and when the safety is pulled back, the trigger and bolt are securely locked. The safety on my Ruger was stiff and quite difficult to engage or disengage, and it would be even more difficult to move with a cold or gloved thumb. I would much rather have a large-buttoned side-tang

safety or a bolt-sleeve safety—one that can be positively and noiselessly disengaged.

Folded heavy sheet steel forms the magazine box; it is welded together at the rear, and there reinforced by a heavier steel strap. The upper sides of the box are curved slightly inward so that the box will fit into the magazine well in the receiver. Integral projections under the receiver, fore and aft of the magazine well, securely and accurately position and hold the magazine box in place.

The trigger guard bow is a very neat light-weight alloy casting. Screws through holes in each end of the bow, threading into the bottom of the receiver, hold it in place in the stock and help hold the barrel and action in the stock. The front end of the guard bow projects far enough forward to hold the rear of the magazine box in place.

The front of the magazine box is held in place by the floorplate hinge plate. The front guard screw, passing through this plate, threads into the recoil lug on the bottom of the receiver. More on this later. The floorplate is connected to this hinge plate by a pin, with the hinge joint on the front end of this plate. Thus the light alloy floorplate covers the head of the front guard screw. A latch in the front top part of the bow holds the floorplate closed. Pressing the serrated button inside the bow allows the floorplate to be swung down for quick unloading. The stainless steel follower is attached to one end of the W-shaped follower spring, and the spring's other end fits into a mortise in the floorplate. The Ruger Parts List indicates that a steel trigger guard bow and magazine floorplate can be ordered.

A Ruger-patented feature of the 77 action is the angled front guard screw, which enters the recoil lug at about a 62-degree angle. This can be clearly seen in the photographs and in the sectional view drawing. The hinge plate, through which this screw passes, has a flat surface at right angles to the screw; on tightening the screw the receiver is not only pulled down into the stock, but is pulled back as well, bringing the rear of the recoil lug in closest contact with the stock. The area under the receiver ring, which includes the recoil lug, is

a most vital area in the bedding of the action. Since it is a well-established fact that a constant contact between the rear of the recoil lug and the stock is a factor in obtaining consistent top accuracy, the Ruger angled guard-screw principle is a sound one. That it fulfills this function seems evident, for all test reports on the 77 indicate high accuracy. I don't think, really, that any individual 77 rifle would be any less accurate if it were fitted with a right-angled front guard screw (as all other centerfire turnbolt actions have), but if the Ruger rearward-angled screw helps hold the recoil lug back against the wood, which it does if it's kept tightened, then I'm all for it. The head of the screw is covered by the front end of the floorplate so there is nothing unsightly about it.

Comments

There are several things I really like about the 77 action, and only one or two things I don't. The first thing I disliked was the original bolt handle, but this soon was changed. The second thing is the safety. The bolt handle stem is too angular for my taste, and I think some will complain about the sharp top rear edge of the stem. The sliding tang safety is in a convenient place and it looks nice, but I believe it would be more functional under all conditions if it was located at the side of the tang, like the safety of the 788 Remington.

What I like most about the 77 action is the Mauser-type extractor. I consider this type much better than the puny claw, hook, sliding or clip-type extractors found in most other modern centerfire turnbolt actions made today. I also like the rugged and buffered Ruger bolt-stop very much. The trigger mechanism is to my liking in that it is simple, rugged and adjustable from the outside. I like the idea of having the scope mounting bases made integral with the receiver, and Ruger's system of securing and anchoring the rings to the receiver is without fault. More than ample provisions are made to vent gases harmlessly out of the action, and I like Ruger's idea of having the vent holes in the bolt directed into the magazine rather than into the left locking-lug raceway, as is done with many other bolt action rifles. I think the flat-sided receiver is pleasing, and I like the idea of not cutting the right side of the loading and ejection port down to the bottom of the locking-lug raceway, as the extra ridge of metal left here makes the receiver more rigid.

Original Ruger Model 77 Markings

The serial number is stamped on the left flange of the receiver ring. Stamped on the left side of the receiver wall is:

RUGER M77

The Ruger firm name and address is roll-stamped on top of the barrel as follows:

**STURM, RUGER & CO.,
SOUTHPORT, CONN. U.S.A.**

The caliber designation is stamped on the breech of the barrel.

When the 1968 Gun Control Act went into effect, Ruger adopted a new serial numbering system for all Ruger guns. Ruger Model 77 rifles made after this change in serial numbering will have the number 70 prefixed to the regular serial number. When this new digit-prefix system was instituted, serial numbers following the prefix numbers were restarted with number 1, thus: (as example the Model 77 rifle) 70-00001.

Takedown and Assembly

Make sure the chamber and magazine are unloaded. To remove the bolt, raise the bolt

handle and pull the bolt back, at the same time swinging the front of the bolt-stop away from the receiver; insert a small pin or nail in the hole in the bottom of the cocking piece and unscrew the bolt sleeve from the bolt. To reassemble, turn the bolt sleeve into the bolt as far as it will go, then back it off until the cocking-piece nose rests in the shallow notch at the rear of the bolt, then remove the pin.

It is not necessary to disassemble the firing mechanism unless some part has to be replaced. In this case it might be best to send the entire assembly to the factory. However, it can be disassembled as follows: Rig up some means (a vise or clamp) to compress the mainspring so the pin in the cocking piece is exposed beyond the end of the bolt sleeve, then drive the pin out. Because the mainspring is very strong, use great care in releasing the clamp lest you be injured by flying parts, or the parts be lost. Reassemble in reverse order, and it is absolutely necessary that you use a clamping arrangement.

To remove the extractor, raise its front end high enough so it can be pushed forward and slipped off the bolt. Do not remove the extractor collar unless necessary because it may be sprung out of shape in so doing. The ejector

and ejector spring can be removed by driving out the ejector pin.

To remove the barrel and action from the stock, open the magazine floorplate, turn out the front guard screw, remove the floorplate and hinge plate from the stock. Turn out the rear and center guard screws, then pull the guard bow and magazine box from the stock. Lift out the barrel and action assembly. Reassemble in reverse order, but tighten the angled front guard screw before tightening the center and rear guard screws.

To remove the bolt-stop, turn out the bolt-stop screw stud. It can be reattached by depressing the bolt-stop plunger with a small screwdriver while turning in the screw stud.

To remove the safety button, lift out the rear end of the safety link, then the safety link can be removed from the safety shaft. To remove the safety shaft, first remove the safety-shaft spring, then pry out the nylon washer from the bolt lock with a round tool, then slide off the bolt lock. To remove the trigger housing (after the safety spring is removed), drive out the trigger-housing cross pin. Remove the sear and spring by driving out the sear pivot pin from left to right. Reassemble in reverse order.

1980 Models

The following is a list and brief description of the principle models of the Ruger M77 which were available prior to and after the introduction of the Ruger M77 Mark II in about 1989. (The Mark II is described in a nearby chapter.)

In 1982 Ruger introduced a new model to their Model 77 lineup. As illustrated here, this model is a carbine with 18.5" barrel and fitted with a classic-styled full-length Mannlicher stock. Ruger calls this rifle the Model 77 International Carbine. It was available in either 243 or 308 caliber.

The M77 Carbine is based on the regular

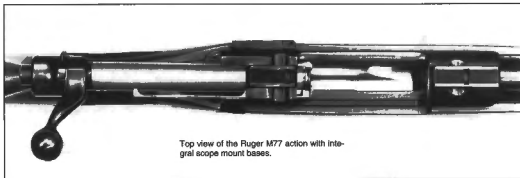
M77 action with integral scope mount bases. Ruger split rings are furnished with the rifle. The stock, made of quality black walnut, will be appreciated by those shooters and hunters who have admired the obsolete Mannlicher-Schoenauer carbine. I believe most of them will prefer the Ruger-designed stock with full curved pistol grip, much less belly and the absence of a cheekpiece which, on the Mannlicher-Schoenauer at least, was a useless adornment. The Ruger stock is fitted with sling swivels, and the front one is a very close copy of the old M/S stirrup design.

In addition to the swivels, the Ruger Carbine stock is also fitted with a steel forend tip, a solid rubber recoil pad and the Ruger pistol

grip cap. In all, it is a very neat package for the deer hunter.

In 1983, Ruger introduced another "new" M77—the "Ultra Light." The Ultra Light has a slim, 20" barrel with either the round-top or integral scope-base receiver. It weighs six pounds. The entire rifle, to my mind, is nothing more than a slimmed-down Model 77—the walnut stock having a black, composite forend tip. Hunters will welcome the weight savings. It's chambered for 243 or 308 only.

The following is some additional information about the other Ruger M77 models. Besides the International Carbine and the Ultra Light, there are three basic models. They are:



Top view of the Ruger M77 action with integral scope mount bases.



Ruger M77 bolt action rifle with International Mannlicher stock, open sights and Ruger steel rings.



The Ruger M77 Magnum rifle was available in 264 Winchester Magnum, 7mm Remington Magnum, 300 Winchester Magnum, 338 Winchester Magnum and 458 Winchester Magnum. This one has the round receiver for standard scope mounts.



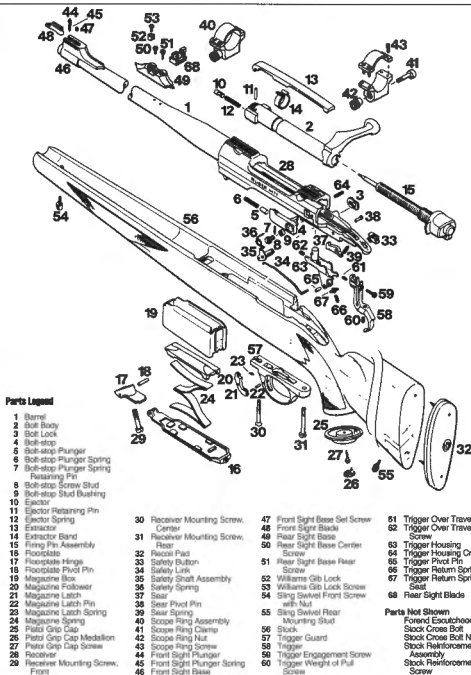
This is Ruger's lightest-weight big game hunting rifle. It is the M77 Ultra Light. It features a 20" lightweight barrel with adjustable open sights, a walnut stock, rubber buttpad, sling swivel studs, a sliding tang safety, and weighs about 6 pounds in calibers 223, 243 Win., 257 Roberts, 270, 30-06 and 308.

Dimensional Action Specifications

	Medium Action	Long Action
Weight	40 oz.	42 oz.
Length	9.00"	9.54"
Receiver width ..	1.315"	1.315"
Bolt dia. ....	.695"	.695"
Bolt travel	4.140"	4.826"
Striker travel ..	.281"	.281"
Bolt face recess:		
Depth .....	.120"	
Diameter		
(30-06 cartridges) .....	.475"	
(belted mag. cartridges) .....	.550"	
Magazine length ..	2.925"	3.390"

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece investment casting of chrome-molybdenum steel. Non-slotted bridge. Integral scope mount bases on ring and bridge, adapted to Ruger mounts.
Bolt	One-piece chrome-molybdenum investment casting with solid dual-opposed forward locking lugs. Base of low-profile bolt handle serves as safety lug, 90 degree rotation.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column five-shot box type with hinged floorplate.
Trigger	Single-stage type adjustable for weight-of-pull, take-up and over-travel.
Safety	Sliding tang type locks trigger mechanism and bolt when pulled back.
Extractor	Non-rotating one-piece spring Mauser-type fastened to bolt body by a collar.
Ejector	Plunger type in bolt head.
Bolt-stop	Mauser-type, fitted to left side of bridge, stops bolt by contacting left locking lug.





Ruger M77 round top receiver shown with Buehler one-piece mount and rings.

1) **Model 77 Sporter**, with 22" barrel, weight 7 pounds, in calibers 220 Swift, 22-250, 243, 6mm, 257 Roberts, 25-06, 270, 280, 7x57mm, 7mm-08, 308 and 30-06. (Note: 24" barrel for the 220 Swift and 25-06).

2) **Model 77 Magnum**, with 24" barrel,

weight 8.75 pounds, in calibers 264 Magnum, 7mm Magnum, 300 Magnum, 338 magnum and 458 Magnum.

3) **Model 77 Varmint**, with 26" barrel, weight 9 pounds, in calibers, 22-250, 220 Swift, 243, 6mm, 25-06, 280 and 308.

A limited number of the sporters were made in 250-3000 caliber.

In 1994, some of these models were still available and all are available in one variation or another based on the Mark II action (see following chapter).



Ruger Model 77 Mark II

EARLY IN 1994, I received word from DBI, the publisher, that they had decided to do a new edition of this book. Ten years had passed since the revised edition was published in 1984. In the interim, Ruger introduced their M77 Mark II.

I had become aware that Ruger was modifying the original M77 action, and earlier *American Rifleman* carried short items on an M77 Mark II. This did not interest me at that time. Then when the magazine published a "Dope Bag" report on the Ruger M77 VT Mark II, I took notice and figured that by then the transitional period of the Mark II was over, and because I had a book to enlarge, I obtained a Ruger M77 VT Mark II and a new Ruger catalog. My description and comments on this rifle and action follow. If you want to learn something about the two transitional variations, you can find the reports in the January, 1994, and July and August, 1992, issues of *American Rifleman*.

Mark II Rifles in 1984 Catalog

The following is a list of the Mark II rifles which are identified as such in the 1994 Ruger catalog:

Ruger M77 Mark II Express Rifle—Features: French walnut stock; metal pistol grip cap; steel trigger guard and floorplate; 22" barrel; express-type front and rear sights; rear sight mounted on express-type ramp; integral scope bases on the receiver; Ruger scope rings; four-shot capacity in standard calibers, three-shot for magnums; chambered for 270, 30-06, 7mm Rem. Mag., 300 Win. Mag. and 338 Win. Mag.

Ruger M77 Mark II Magnum Rifle—Features: Same as the Express rifle except for the following: calibers 375 H&H, 404 Jeffery, 416 Rigby; stock is checkered Circassian walnut; weight in 375 H&H and 404 Jeffery about 9.25 pounds, 416 Rigby about 10.25 pounds; magazine capacity: four rounds in 375 H&H and 404 Jeffery, three in 416 Rigby.

Ruger M77 Mark II All-Weather

Rifle—Features: All-weather sporter with composition stock; all metal parts stainless steel; right- or left-handed; scope rings; with or without open sights; sling swivel loops; in calibers 223, 243, 270, 308, 30-06, 7mm Rem. Mag., 300 Win. Mag. and 338 Win. Mag.

Ruger M77 Mark II International Carbine—Features: 18.5" barrel; full-length Mannlicher-style stock; open sights; scope rings; in calibers 243, 270, 308, 30-06; weight 7 pounds.

Ruger M77 RS Mark II Rifle—Standard sporter. Features: walnut stock; 22" and 24" barrels; scope rings; with or without open sights; in calibers 243 Win., 25-06, 270, 7mm Rem. Mag., 30-06, 308, 300 Win. Mag., 338 Win. Mag. and 458 Win. Mag.

Ruger M77 Mark II Ultra Light Rifle—Features: 20" barrel; weight 6 pounds; scope rings; walnut stock; in calibers 223, 243 Win., 257 Roberts, 270, 30-06 and 308.

Ruger M77 VT Mark II Target Rifle—Features: 26" heavy barrel; no sights; scope mount rings; laminated hardwood stock; weight about 10 pounds; beavertail forend; stainless steel barrel, receiver and bolt; two-stage trigger; in calibers 223, 22 PPC, 22-250, 220 Swift, 6mm PPC, 243 Win., 25-06 and 308.

All the rest of Ruger's high-powered turn-bolt rifles have barrels, receivers and bolts made of a chrome-moly steel.

My rifle is the Ruger M77 VT Mark II. Purchased in 1994, it is this action which I will describe.

The Ruger M77 VT Mark II Action

The receiver of the Ruger Mark II action is a stainless steel investment casting. It is very similar to the receiver made for the standard M77 rifle in that it has a flat bottom, integral recoil lug, raceways for the locking lugs, the same bolt-stop, and it is machined on top to accept the standard Ruger scope mount rings. However, it differs from the standard M77 receiver in three respects. Two

of these are that it has a narrow slot in the left bottom of the bridge area to accept the ejector, one not unlike that in the Winchester pre-'64 M70 action. The second noticeable difference is that the right side of the tang is flattened on top and has a vertical hole to accept the safety. The third difference, and a prominent one, can be seen only when the barreled action is removed from the stock. This difference is the trigger housing. It is not a separate part, as in most all other turn-bolt actions, but an integral part of the receiver casting. It looks a bit odd, but what better way to do it? The receiver also differs in that the receiver ring is made .500" longer to provide more threads inside for a longer barrel shank and is made from stainless steel. This longer receiver is used only on the VT Model and not on the other Mark II models.

The bolt of the Mark II VT is made of stainless steel. About all that the old and new bolts have in common is the dual opposed forward locking lugs, low-profile handle, anti-bind feature, cocking cam notches and firing mechanism. The striker or firing pin parts are also different, as are the bolt sleeve and bolt sleeve lock. Starting at the bolt head, and as shown in the photo nearby, the Mark II bolt has the cartridge head recess undercut to allow a cartridge fed from the magazine into the chamber to slip under the extractor hood, as in the M98 Mauser. As explained several times before in this book, this feature prevents double loading in that if the bolt is not entirely closed, the cartridge will be extract-

(Above) This is the Ruger M77 VT MK II Target rifle. It has a heavy 26" stainless steel barrel, with stainless receiver, bolt, trigger guard/floorplate finished in natural gray matte finish. The target-style stock is of laminated hardwood. The gun also has a free-floated barrel, three-position safety and double-stage target-quality trigger. It's available in calibers 223, 22-250, 22 PPC, 6mm PPC, 220 Swift, 243 Win., 25-06 and 308.



Right side of the Ruger M77 VT MK II action with open bolt.

ed and ejected when the bolt is opened. More recently, this feature has been described as controlled feeding. I have never used this term before, but it is apt. Next in the photo of the bolt head, you will notice there is no ejector plunger as in the old bolt, but you will see the narrow slot cut into the bolt face for the Winchester M70-style ejector. This type of controlled feeding prohibits the use of the plunger-type ejector.

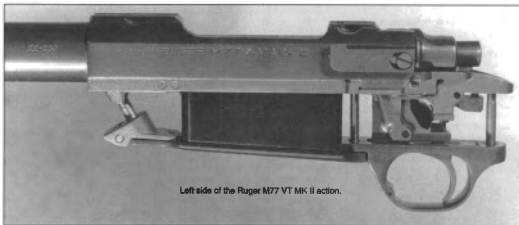
In the photo of the Mark II bolt head, you can see the narrow ejector slot. It is an angled slot with the angle starting near the rear of the left locking lug. It is no different than the ejector slot on the Winchester pre-'64 M70 bolt. This slot is there to complete

the ejector system, which is also a copy of the Winchester. This ejector is simply a thin spring-tensioned lever positioned in the groove in the bottom rear and left side of the receiver.

At this time, I must mention and describe the safety and the bolt lock. Both are new features, and I know of no other turnbolt action having these parts the way Ruger makes them. The safety rotates in a vertical hole in the right side of the tang. Swung as far forward as it will go, the safety is on the Fire position. Swung to the rear as far as it will go, it is in the Safe position, which locks both the bolt and the trigger. When in the intermediate position, it locks only the trig-

ger, but allows the bolt to be operated. When the bolt is closed, the safety-lever lies between the bolt sleeve and the receiver tang, and at first glance it appears either connected to the bolt sleeve or receiver tang.

The bolt lock is a slender spring-tensioned plunger positioned in a hole lengthwise through the extreme right side of the bolt sleeve. In its normal position, part of this plunger projects from the rear of the bolt sleeve where, when the safety is pushed as far back as it will go, it pushes the plunger ahead. This, in turn, causes the front end of the plunger to project beyond the sleeve and into a hole in the rear end of the bolt, thus locking it. If the safety is



Left side of the Ruger M77 VT MK II action.

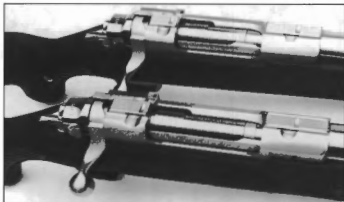


The barrel and action of the M77 Mark II All-Weather rifle are made of corrosion-resistant, 400-series stainless steel. The stock is of fiberglass-reinforced DuPont Zytel.

moved to the intermediate position, the bolt lock plunger moves back and the bolt is unlocked.

Inside the trigger mechanism, the lower end of the safety pivot stem blocks the trigger whenever the safety is in the Safe or intermediate position. It is all quite novel, and I know of no other rifle with a similar arrangement.

Mentioned before as one of the different features of the Mark II action, as compared to the original Model 77, the trigger housing is cast integral with the receiver. The sear, trigger and their associated springs and pins are contained between the walls of this steel housing. A steel bar partly between the front of this housing is tack-welded in place to enclose the walls, and three holes are drilled and tapped which contain set-screws to adjust the trigger for weight of pull, sear engagement and over-travel. Then, to ensure a permanent adjustment after the factory has properly made the adjustments, three cross holes drilled and tapped through each of the adjustment screw holes, and fitted with six small set-screws, lock each adjustment screw in place. The as-cast surface of this housing, the spots of welding, as well as the



The Ruger M77 Mark II All-Weather rifle is shown in two action lengths: a short action for 223 Rem., 243 Win. and 308 Win., and a long action for 270 Win., 30-06, 7mm Rem. Mag. and 300 Win. Mag.

rest of the underside of the receiver seem a bit crude, but everything functions as it should.

Rifle manufacturers of late have given much thought to the trigger mechanisms for

their guns. It seems that most of today's rifles have far heavier trigger pulls than were found on rifles made before about 1970. It is not unusual to find a 5-pound pull. Often, too, the sear engagement or take-up is far in



Right and left views of the Ruger M77 Mark II Sporter. In most calibers, it is an ideal hunting rifle.



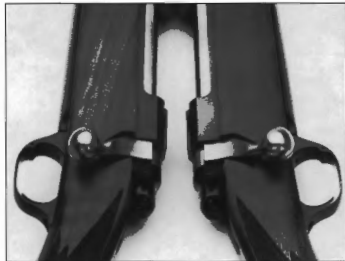
PART II: Commercial Rifles & Actions



The trigger guard on the M77 Mark II houses a beautifully redesigned floorplate latch which is flush with the contours of the trigger guard.



The Ruger M77 Mark II has a whole new trigger safety mechanism which allows the shooter to unload the rifle with the safety on. Fully forward, the rifle is in the Fire position.

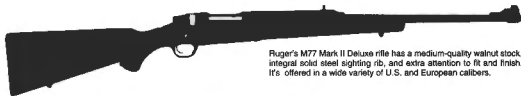


The Ruger M77 Mark II Left-Hand rifle (above left and below) is a mirror image of the Ruger M77 Mark II Right-Hand rifle (above right).

excess of what most experienced rifle shooters want. This is all done for safety and to avoid lawsuits. Anyway, Ruger has done something new, or at least different, with the M77 VT Mark II. The trigger is something equivalent to a modified double-stage pull. The first stage of the trigger pull is rather long and light, and very noticeable. That first stage is so light that pulling it back to the second stage is done almost effortlessly. It's very apparent when the second stage is reached, and such a double-stage pull is very easy to get use to. On my Mark II VT rifle, the second stage pull was a short and crisp 3.5-pound pull. I can live with that. I like the idea of having long and light initial trigger travel, and if that adds to the safety of the rifle in the hands of a novice or careless shooter, so much the better. If it will prevent a liability suit, that's great. On all other Ruger Mark II rifles, this double-stage pull is eliminated and the weight of pull is increased to 5 pounds.

The remainder of the Mark II action, the magazine box, trigger guard, hinge floorplate and floorplate catch are almost identical to previous Ruger models. It even has the angled front guard screw as on the earlier

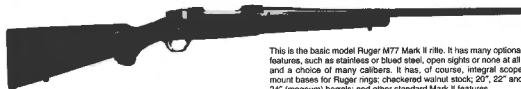




Ruger's M77 Mark II Deluxe rifle has a medium-quality walnut stock, integral solid steel sighting rib, and extra attention to fit and finish. It's offered in a wide variety of U.S. and European calibers.



Many deer hunters prefer a light, short-barreled rifle such as the M77 Mark II International Mannlicher-stocked carbine. It weighs only about 7 pounds and is available in 243, 270, 308 and 30-06.



This is the basic model Ruger M77 Mark II rifle. It has many optional features, such as stainless or blued steel, open sights or none at all, and a choice of many calibers. It has, of course, integral scope mount bases for Ruger rings; checkered walnut stock; 20", 22" and 24" (magnum) barrels; and other standard Mark II features.



(Above and below) Ruger M77 Mark II Magnum rifle. This is the first Bond Street quality, African safari, big game hunting rifle produced by a major American firearms manufacturer. Calibers are 375 H&H, 404 Jeffery, (four-shot magazine), 416 Rigby, (three-shot magazine); barrel length is 26", with integral steel rib; weight about 9.25 pounds (375, 404), 10.25 pounds (416); length is 40.5" overall. The stock is of Circassian walnut with hand-cut checkering, swivel studs, steel grip cap, rubber buttpad. The rifle has a ramp front sight and three-leaf express rear on a serrated integral steel rib, which also serves as a base for the front scope ring. This gun uses an enlarged Mark II action with three-position safety, stainless bolt, ordnance steel trigger guard and hinged floorplate. It is of controlled feed design. Introduced 1989.



PART II: Commercial Rifles & Actions



Top view of the Ruger M77 Magnum action (below), bend-type ramp front sight (above), and bottom view of the action (left).



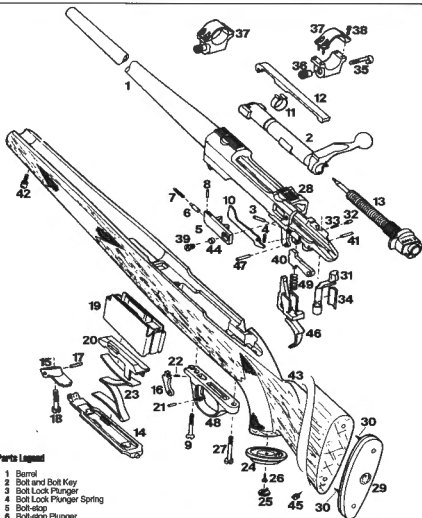
er models. On the VT model, the trigger guard and floorplate are made of stainless steel.

Comments

I can only comment about the action on

my M77 VT MK II rifle, which is somewhat different than the MK II actions on the other Ruger rifles. The receiver ring is longer than on a regular M77 action, and one reviewer wrote that this provides a more secure and positive fit between barrel

and receiver, and thus holds a heavy free-floating barrel steadier. I doubt whether this is true. Suppose, then, for example, if the receiver ring were twice as long or more, would this make the barrel steadier yet? If the barrel and receiver are properly thread-



Parts Legend

- 1 Barrel
- 2 Bolt and Bolt Key
- 3 Bolt Lock Plunger
- 4 Bolt Lock Plunger Spring
- 5 Bolt-stop
- 6 Bolt-stop Plunger
- 7 Bolt-stop Plunger Spring
- 8 Bolt-stop Plunger Spring Retaining Pin
- 9 Center Mounting Screw
- 10 Ejector
- 11 Extractor Band
- 12 Extractor
- 13 Firing Pin Assembly
- 14 Floorplate Assembly
- 15 Floorplate Hinge
- 16 Floorplate Latch
- 17 Floorplate Pivot Pin
- 18 Front Mounting Screw
- 19 Magazine Box
- 20 Magazine Follower
- 21 Magazine Latch Pin
- 22 Magazine Latch Spring
- 23 Magazine Spring

- 24 Pistol Grip Cap
- 25 Pistol Grip Cap Medallion
- 26 Pistol Grip Cap Screw
- 27 Rear Mounting Screw
- 28 Receiver
- 29 Recoil Pad
- 30 Recoil Pad Screws
- 31 Safety Selector
- 32 Safety Selector Detent
- 33 Safety Selector Detent Spring
- 34 Safety Selector Retainer
- 35 Scope Base Clamp
- 36 Scope Base Nut
- 37 Scope Ring Assembly
- 38 Scope Ring Screws
- 39 Scope Stud
- 40 Sear

- 41 Sear Pivot Pin
- 42 Sling Swivel Screw
- 43 Stock
- 44 Stud Bushing
- 45 Swivel Mounting Screw
- 46 Trigger
- 47 Trigger Pivot Pin
- 48 Trigger Guard
- 49 Trigger/Sear Spring

Parts Not Shown

- Bolt Lock Plunger Retainer
- Bolt Sleeve
- Cocking Piece
- Ejector Spring
- Ejector Pivot Pin
- Firing Pin Cross Pin

ed, machined and set up, there is no real need to have a longer receiver ring and barrel shank than the regular M77. I do not object to the longer receiver as such, but doubt the claims made about it.

I don't like the way the VT receiver ring is tapered, as if it were polished excessively. I think it should be neatly squared off. I am not against investment castings, but I like the parts made and finished so they do not look like castings. This can be achieved, of course, but it adds greatly to the cost of manufacture. I have always considered all Ruger firearms excellent values for the money, and that they are. However, my VT MK II seems to lack proper finishing.

That the VT MK II trigger housing is an integral part of the receiver seems to be a very good idea, and although I do not like to see evidence of parts welded together, I can put up with it.

On my particular MK II VT rifle, the safety did not easily slip over the end of the bolt lock plunger on engaging it. I believe a couple of file drags under the safety button, where contact is made with the bolt lock plunger, would suffice to correct this little problem.

I have given little space in this book to comment much on any stock, and I won't do it here. I like best a stock made of walnut and designs on the conservative side. This Ruger Mark II rifle is called a target rifle, and it surely is. Having long experience with four-position target shooting, and after trying a variety of stock designs, I could not ask for a better shaped, sized and proportioned stock than on this Ruger. It comes close to the old Winchester Marksman stock, which has always been my first choice for target work. If the barrel is full-floated, I see no earthly reason for having a laminated stock.

A Personal Account

Sometime in the early 1970s, and shortly after the first edition of this book was published, I received a letter from the Ruger company. It briefly stated that they were sending me a Model 77 V Varmint rifle in 22-250 caliber to do with as I pleased. I thanked them, of course. At the time, I was busily engaged in another project and forgot about my gift. Some time passed before I could spend time at my range. I had a young man who loved to shoot, and I often let him shoot my rifles. He soon became very proficient at the benchrest. At my



The Ruger Magnum barrel and sighting rib with cross-serrations is machined from a single bar of steel. This feature has customarily been available only on the most expensive, custom-built, big game rifles traditionally associated with the British, Bond Street, African safari rifles.

home one day he spotted the Ruger M77 V and took a keen interest in it. He wanted badly to shoot it and did so the next time we went to the range. Shooting ammunition loaded with my long-time favorite powder and bullet, and after about five shots with the rifle (I had mounted a cheap scope on it), he fired a five-shot, one-hole group at 100 yards that measured .225" center-to-center. He and I measured that group very carefully several times before settling on the .225 figure. This was from a brand-new rifle. I had done nothing to it except wipe out the bore and chamber with a dry patch. After the shock at seeing that first small group, my young friend fired several more five-shot groups with almost equal results. I have never before or since

owned a factory rifle as accurate as this was. I do not believe that the Ruger factory tested this rifle for accuracy before sending it to me. I had no previous reason to write about this rifle except for this book, but I hope it is not too late to let my readers know what a wonderful rifle I had gotten from Ruger. So, thank you, you folks at Ruger for that tack-driving rifle. My young friend who tested it now owns it. It is in good hands.

If I were still a varmint and target shooter, and if I had to make a choice between Ruger's first varmint rifle and the M77 VT Mark II, I would choose the former. In my opinion, the M77 VT Mark II is just too bulky and heavy. For work on varmints the old M77 V is hard to beat.



IN 1968, THE Sturm, Ruger firm introduced a high-powered bolt-action rifle which has since gained considerable renown in the United States and Canada. Ruger called it the Model 77. It was a well planned rifle with a very strong, well made and safe action, and in my eyes a very good-looking one. Soon after it came on the market, I obtained one and I liked every feature about it, especially the stock.

The most remarkable thing about the Ruger M77 was that its action was almost entirely assembled with parts made by the investment casting process. Making guns this way was by then nothing new to Ruger, for they had used it in the manufacture of their revolvers for a long time. The Ruger people knew that art from A to Z. The day I received my M77, I looked it over with a critical eye and outwardly saw no evidence that the receiver, bolt, and trigger guard parts were anything other than machinings.

I really liked the stock on my rifle. It was just plain classic, and shaped to perfection. It had no white lines, no flared pistol grip, no raised comb or cheekpiece and no surplus wood. What it did have was a plain rubber buttpad, the neatest capped pistol grip on any commercial rifle that I knew of, a simple rounded forend with a smoothly rounded tip, a perfectly sanded level surface, superb non-glare finish, ample hand-checked panels on grip and forend, and straight lines.

I am sure the M77 sold well from the start, and it soon became available in a wide variety of calibers and a few different stock styles, such as target-varmint, lightweight and Mannlicher. All stocks were made of walnut and I liked all of them.

Then, in 1983, Ruger introduced a rimfire bolt-action rifle called the Model 77/22, made with a lot of investment-cast parts. Again I bought one and again I liked it. It

has a few novel features, such as a plastic rotary magazine box and a new way of fastening the barrel to the receiver. Best of all, it had a Ruger stock. About the only feature I did not much care for was that, because of the ten-shot rotary magazine being as wide as it was, the middle section of the stock was wider than I liked. But it was a sound 22 rimfire. No sooner had it hit the market than I began getting inquiries about it. One was, "Is this action strong enough, or long enough, or suitable for rechambering to the 22 Hornet?"

In short, it wasn't. Ruger must also have gotten inquiries on this, and they did something about it. This brings us to the topic of this chapter. Ruger introduced their new rifle as the Model 77/22 Hornet in 1994. After a long wait I obtained one.

Chambered for the 22 Hornet and so marked on the barrel, this light and sporty bolt-action rifle weighs only six pounds without scope, has a round, slim tapered 20" barrel, and a classic-style walnut stock. The stock is fitted with a black rubber buttpad, an oval black pistol grip cap with the Ruger Blackhawk medallion in it, and studs for detachable sling swivels. Like other Ruger bolt-action rifle stocks, this one is minus the raised comb and cheekpiece, but with a perfectly shaped, sized and placed pistol grip, and a rounded, tapered and round-ended forend tip. Both the grip and the forend are checkered. As with most other Ruger stocks, the stock on my rifle has a very smooth and level surface that is given a thin, non-glare finish that complements the wood. The action top has integral scope mount bases for the excellent Ruger scope rings. The rifle features twin locking lugs on the bolt, fast lock time, an excellent single-stage trigger, and a five-shot rotary magazine. Except for the black plastic magazine, the action is all steel investment castings. The action func-

tions smoothly, the trigger pull is good and cartridges feed out of the magazine without a hitch.

There is something intriguing about the little 22 Hornet cartridge and I cannot place my finger on it. Perhaps it is its small size. Anyway, I fell under its spell long ago and why that was and still is so, I do not know. A great many other shooters feel the same way. There have been many different makes and models of rifles chambered for it, and I sampled a number of them. I had to wait months before my new M77/22 Hornet arrived, and I wasted no time in getting acquainted with it.

The Ruger M77/22 Hornet Action

To begin, the receiver, bolt and practically all of the other parts (except the pins, springs and screws) are investment castings of steel. Another exception is the magazine, which is mostly plastic. It appears to me that here is a strong action, one that functions as it should, is easy to operate and reliable. With the exception of the plastic magazine, I like everything about it and that includes the stock.

The receiver is of one-piece construction of chrome-moly steel. The ring and bridge have integral mount bases to accept the quick-detachable Ruger scope rings. Unlike the Ruger M77/22 rimfire action, which has a slip-in barrel, the Hornet barrel threads tightly into the receiver. The 20" barrel has a muzzle diameter of only .540", making for a light and well-balanced sporter. The receiver

(Above) The Ruger M77/22 Hornet rifle. Weighing only 6.25 pounds, fitted with a slender 20" barrel and a well proportioned walnut stock, this is one of the neatest 22 Hornet rifles ever to be produced in the United States.



Flight side of the closed M77/22 Hornet action.

has the usual loading/ejecting port and magazine well opening, and a tang of sorts. Below the bridge area, an integral part of the receiver forms the housing for the trigger and safety parts. It is sort of an abbreviated version of the housing used in the Ruger Mark II action.

The bolt on this rifle is comprised of two parts, the non-rotating part up front, which Ruger calls the breechblock, and the rear part, or the bolt body. The rear portion rotates and has dual locking lugs on its forward end, and the bolt handle on the rear. These two parts are held together by two pins. The raceways for the locking lugs extend all the way through the bridge and along the full length of the left receiver wall. The cross-section of the breechblock is the same as the bolt body. This effectively gives the breechblock opposing ribs which not only prevent it from rotating, but also serve as bolt guides and as an anti-bind feature.

An oblong slot near the front of the bolt body provides a vent for powder gases in the rare case of a pierced primer or split in the cartridge head. When the bolt is closed, this vent is directly over the magazine.

The simple spring-tensioned claw extractor is fitted into the front end of the right rib while the left rib is deeply grooved to slide over the ejector lug. The ejector lug is made integral with the trigger guard plate. The bottom of the breechblock is flat, and the front is recessed for the cartridge rim. This rim is undercut to allow cartridges to rise up and under the extractor when fed from the magazine. This is called

controlled feeding.

The opposing locking lugs on the front end of the bolt body are solid, and they lock up in a circular recess in the receiver bridge. These lugs are more than adequate in strength for the Hornet cartridge or for any other similar cartridge for which Ruger might someday chamber this rifle. The bolt handle can hardly be called the safety lug because the safety, built into the right side of the receiver, leaves only a small amount of support metal behind the bolt handle root. In connection with this, there is only a token amount of extraction camming on the upturn of the bolt handle. The firing mechanism is composed of the bolt sleeve, cocking cam, firing pin and coil mainspring. As in most bolt-action rifles, there is a deep cocking cam notch and a shallower notch that serves to hold the bolt sleeve from tumbling when the action is open. The bolt sleeve is threaded into the bolt body as in many other rifles.

The trigger assembly is contained in a housing which appears to be an integral part of the receiver. Like most single-stage triggers made in recent years, this mechanism is comprised of the trigger and sear, plus the two pins on which they pivot, and the two springs which supply tension to them. But unlike most triggers, there are no adjustment screws, which makes it very difficult for tinkers to tinker with it to make an adjustment. The weight of pull of the trigger on my Ruger Hornet is 4.5 pounds, with a short, crisp pull.

The safety Ruger uses on this rifle is like that on their Mark II M77. It is a three-posi-

tion safety: swung forward it is in Fire position; swung back it is in the Safe position where it locks both the trigger and bolt. In the intermediate position it locks only the trigger, yet allows the bolt to be opened and closed. This safety is unique in that it has a vertical stem fitted into the right side of the receiver tang, and this stem extends down to contact the trigger. Its end is so shaped that it blocks the trigger except when the safety is in the Fire position. At the upper end of this stem, a serrated wing lying between the tang and bolt sleeve provides the means to operate the safety.

The bolt lock on the Ruger Hornet is also the same as on the Mark II Ruger as described in another chapter. It is a spring-tensioned plunger or pin positioned in the right side of the bolt sleeve. The safety wing depresses this plunger when the safety is swung to the Safe position. Its front end engages the bolt to lock it closed.

The steel trigger guard is an unusual combination of the trigger guard bow itself, the magazine release and the rear magazine wall. After first removing the magazine and the rear guard screw, the trigger guard can be removed by swinging it forward. At the upper end of this wall there is a hook of sorts which engages a projection on the bottom of the receiver, and on swinging the guard forward it is released from the receiver and can be lifted out. In effect, this part secures the stock to the receiver when the rear guard screw is tightened. It must have taken a lot of figuring and trial and error work to make it work. But it works. It is quite an investment casting, to say the least.



Left side of the closed action.

A projection below the receiver ring, the width of the receiver and extending about halfway into the magazine opening in the stock, forms a wall for the front of this opening. Ahead of this wall is a piece of steel with a hole in it for the front guard screw. This piece is dished out to serve as a slide when the magazine is inserted, and to provide fingertip room to remove the magazine if it does not fall out freely when the magazine catch is depressed. This piece, combined with the rear guard screw, securely anchors the stock to the barrel and action.

As mentioned, the magazine catch is

built into the trigger guard. This catch is a spring-backed plunger with a hole in its tip to hold the rotary magazine in place. The release lever forms part of the bottom of the trigger guard. Depressing its forward end draws the catch inward to release the magazine. While the front and rear of the magazine fit between walls of steel, the sides of the magazine are walled in by the stock wood.

The magazine is made of black plastic and steel. The main box is plastic, but the hubs at each end and the cartridge guide lips at either side of the opening are of steel. The rotary spool is plastic.

Markings

My Ruger Model 77/22 Hornet is marked as follows:

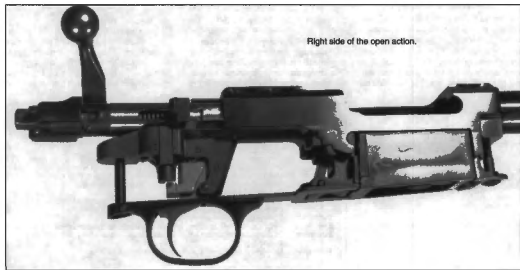
One the left receiver wall is:

RUGER 77/22

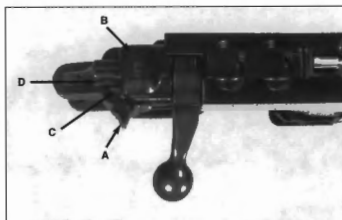
The serial number is stamped on the left side of the receiver ring. The caliber is stamped on the left side of the barrel breech:

.22 HORNET

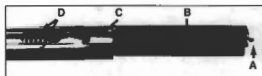
The top of the barrel is marked as follows:



Right side of the open action.



The rear end of the Ruger M77/22 Hornet bolt and safety showing: (A) safety, (B) bolt sleeve, (C) bolt lock plunger, (D) notch in cocking piece for the safety. In this photo the safety is shown in its intermediate position. When swung back, the safety depresses the locking plunger, which locks the bolt.



The bolt of the Ruger M77/22 Hornet showing: (A) one of two locking lugs, (B) the breechblock, (C) one of two locking lugs, and (D) the bolt handle sleeve and oblong gas vent hole.



Underside of the Ruger M77/22 Hornet bolt showing: (A) ejector groove, (B) one of two locking lugs and (C) hole for the breech block retainer pin.

Before using gun—read warnings in instruction manual available free from—Sturm, Ruger & Co. Inc. Southport, Conn. U.S.A.

Disassembly & Reassembly

Each and every M77/22 Hornet rifle Ruger ships is accompanied by an owner's manual. In this manual are complete instructions, with illustrations, on how to disassemble and reassemble the rifle. I will not repeat them here, although I will give a brief outline of how to remove and disassemble the

bolt, and how to separate the stock from the barrel and action.

To remove the bolt, raise the bolt handle fully and open the bolt. This exposes the bolt-stop button. Depress it and remove the bolt. Follow the directions in the manual and separate the breechblock from the bolt body. To remove the bolt sleeve and firing pin assembly, turn the bolt sleeve counterclockwise only enough to move the cocking cam onto the hump between the shallow notch it was in and the deeper cocking cam notch. This allows insertion of a pin into the hole at the lower rear end of the cocking cam. I find

that a small Allen wrench that just enters this hole is the very best pin for this. With this Allen wrench in place, turn the bolt sleeve counterclockwise while drawing back stoutly on the Allen wrench. The bolt sleeve can then be unscrewed all the way out. As the manual suggests, do not attempt to remove the firing pin from the sleeve.

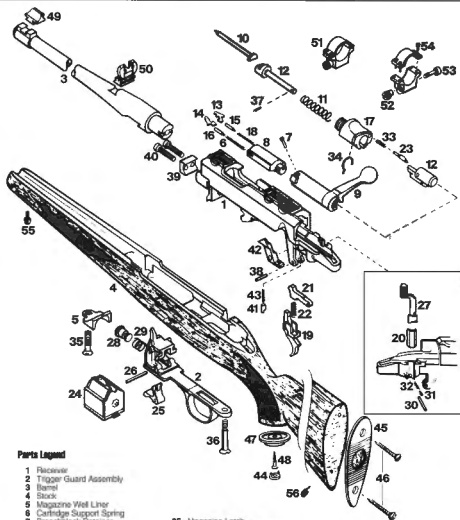
To separate the stock from the action, first remove the magazine and then the rear guard screw. This allows the trigger guard to be swung down and forward from the stock until it becomes unhooked from the receiver and withdrawn. Then remove the

Disassembled Action Specifications

Receiver length	8.19"
Receiver width	1.21"
Bolt body diameter	.875"
Bolt travel	2.30"
Striker travel	.240"

General Specifications

Type	..... Bolt-action repeater, operated by bolt handle.
Receiver	..... One-piece investment steel construction, machined with integral scope mount bases, flat sides.
Bolt	..... Two-piece, non-rotating breechblock (front section of bolt), rotating rear bolt with dual opposed locking lugs; bolt handle serves as safety lug.
Ignition	..... One-piece firing pin, coil mainspring; cocks on upstroke of bolt handle.
Magazine	..... Detachable rotary spool box magazine, five-shot capacity.
Trigger	..... Non-adjustable single stage.
Safety	..... Three-position, horizontal pivoting safety blocks trigger in intermediate position, locks bolt and blocks trigger in Safe or rear position.
Extractor	..... Spring-backed claw extractor.
Ejector	..... Integral part of trigger guard, left side of breechblock grooved to slide over it.
Bolt-stop	..... Pivoting lever in bottom left of receiver, stops bolt on contacting with left locking lug.
Takedown	..... None provided, barrel threaded tightly into receiver.

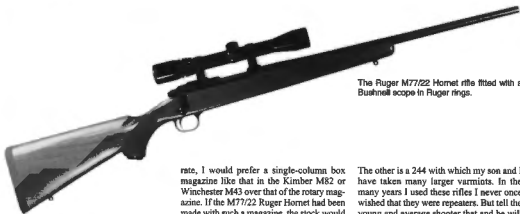


Parts Legend

- 1 Receiver
- 2 Trigger Guard Assembly
- 3 Barrel
- 4 Stock
- 5 Magazine Well Liner
- 6 Cartridge Support Spring
- 7 Breechblock Retainer
- 8 Breechblock
- 9 Bolt
- 10 Firing Pin
- 11 Striker Spring
- 12 Striker/Cocking Piece Assembly
- 13 Extractor
- 14 Cartridge Support
- 15 Extractor Plunger
- 16 Cartridge Support Plunger
- 17 Bolt Sleeve
- 18 Extractor Spring
- 19 Trigger
- 20 Safety Selector Retainer
- 21 Sear
- 22 Trigger/Sear Spring
- 23 Bolt Lock Plunger
- 24 Magazine Complete

- 25 Magazine Latch
- 26 Magazine Latch Pivot Pin
- 27 Safety Selector
- 28 Magazine Latch Plunger
- 29 Magazine Latch Plunger Spring
- 30 Sear Pivot Pin
- 31 Safety Selector Detent
- 32 Safety Selector Detent Spring
- 33 Bolt Lock Plunger Spring
- 34 Bolt Lock Plunger Retainer
- 35 Front Mounting Screw
- 36 Rear Mounting Screw
- 37 Striker Cross Pin
- 38 Trigger Pivot Pin
- 39 Barrel Retainer
- 40 Barrel Retainer Screws
- 41 Bolt-stop Plunger
- 42 Bolt-stop

- 43 Bolt-stop Plunger Spring
- 44 Pistol Grip Cap Medallion
- 45 Buttplate
- 46 Buttplate Screws
- 47 Pistol Grip Cap
- 48 Pistol Grip Cap Screw
- 49 Front Sight
- 50 Rear Sight
- 51 Scope Ring
- 52 Scope Ring Nut
- 53 Scope Ring Clamp
- 54 Scope Ring Screw
- 55 Sling Swivel Front Screw with Nut
- 56 Sling Swivel Rear Mounting Stud



The Ruger M77/22 Hornet rifle fitted with a Bushnell scope in Ruger rings.

front guard screw and separate the wood from the action. Reverse the process to re-assemble them.

Comments

There is really only one thing that I do not like about the Ruger M77/22 Hornet and that is the middle section of the stock. It is too wide and, for me at least, it spoils the otherwise most excellent stock. I realize that this width is necessary because of the rotary magazine. I commented about this in the chapter on the Steyr-Mannlicher rifle. At any

rate, I would prefer a single-column box magazine like that in the Kimber M82 or Winchester M43 over that of the rotary magazine. If the M77/22 Ruger Hornet had been made with such a magazine, the stock would have a much narrower middle section. It would then look better and be easier to carry. I know the market trend well, and I believe the reason Ruger adopted the rotary magazine for this rifle is that most shooters want it.

Going one step further, I would much prefer that my Ruger Hornet had no magazine at all. I have used with great success and pleasure several bolt-action varmint rifles made up as single loaders. One of my long-time favorites is chambered for the 219 Wasp, and with this cartridge I have taken a great many prairie dogs and crows.

The other is a 244 with which my son and I have taken many larger varmints. In the many years I used these rifles I never once wished that they were repeaters. But tell the young and average shooter that and he will only spoof it. Still, I know that if Ruger had made this rifle as a single shot, it would not sell. Maybe I am old fashioned or set in my ways, but throughout the many years I enjoyed varminting I always used a single shot, or if the rifle was a repeater I used it as a single loader. No magazines to load or unload, no magazines to get damaged or become lost, just pure enjoyment in shooting the rifle and making every shot count. Perhaps the next version of the Ruger M77/22 Hornet will have a heavier barrel, and then I would surely want it to be a single shot.



Sako Rifles

SAKO IS A relatively new name in the firearms field, especially to American shooters, but it is a name which has become highly respected since the introduction of Sako rifles in the United States. The Sako firm was first known as Oy Sako AB, and later changed to Sako, Ltd. The company is located in Riihimäki, Finland. An interesting event happened to the early Sako firm. *The Book of Rifles*, by W.H.B. Smith and J.E. Smith, relates a tale about it. According to this book, the Sako firm was once owned outright by the Red Cross of Finland. It is said that this came about shortly after WWII, when Russia began appropriating arms factories in the countries they had occupied. Rather than have the Sako plant fall into Russian hands, the Finns talked the Finnish Red Cross into taking complete ownership of the plant. Afterward, the ownership was changed to Oy Nokia AB. Whatever the circumstances, the Sako people designed and put into production a miniature Mauser-type bolt-action repeater for the American market, known as the Sako L46. Introduced late in 1949, it was imported into this country by Firearms International Corp.

When shooters began reading about the little L46 Sako rifle, it soon became popular. When gunsmiths learned they could buy the L46 action separately it really caught on. Then, with a little nudging from the importer, Sako took heed, making a few changes in the action and rifle to better satisfy American tastes. Other changes were made from time to time, and additional actions and rifles introduced to handle a wider variety of cartridges than the two originally introduced in the L46. The end result is the modern Sako action, which has no peer. The Sako action is synonymous with high-quality material and workmanship.

Since their introduction after WWII, the Sako firm has several times changed the designations and names given to the different centerfire turnbolt actions and rifles they have made. They began with the L46 Vixen, L57 Forester, and the L61 Fimbeare. A number of years later, the L46 Vixen became the A1, L57 Forester became the A2 and L61 Fimbeare became the A3. During this time

they also made some changes and adopted new models such as the L579, L61R, L461 and Bench Rest single shot. Then, to further confuse things, in the 1994 Stoeger catalog they list the following: Hunter Lightweight on the short, medium and long actions; Classic on the medium and long actions; TRG-S on the long action; Deluxe Lightweight on the short, medium and long actions; PPC USA BR/Varmint, Heavy-Barrel-Single Shot; Mannlicher-style Carbine on the medium and long actions; Varmint (Heavy Barrel) on the short and medium actions; TRG-21 in 308 cal.; Safari Grade on the long action; Super Deluxe (special order); laminated stock on medium and long actions; FiberClass on long actions, and finally, left-hand models on Hunter, Classic and Deluxe.

The Sako L46 Action

When the Sako L46 action was first introduced it was universally described as a miniature Mauser. Though not a very accurate description, it was a "miniature" action in that it was made especially for the 22 Hornet and 218 Bee cartridges, and a "Mauser" because it had a one-piece bolt with dual opposed locking lugs up front. However, this thumbnail sketch does not fully describe this action.

The L46 one-piece receiver is not unlike that of the Mauser Model 98 action, but it is, of course, shorter and smaller and thus became the Sako Short action. The receiver ring and bridge are the same diameter, each with integral male tapered-dovetail scope mount bases on top. These base tops, flat and matted, taper narrower to the rear. The bridge dovetail, less wide than the front one, is also used to attach the Sako adjustable receiver rear sight. These integral dovetail bases, providing the very best means of attaching scope mount rings, are a very commendable feature. All Sako bolt actions after the L46 have this feature. Sako made scope mounting rings to fit their actions, and the rings are available in three heights (low, medium and high) for scopes of 1" or 26mm diameter, including an extension ring. Sako rings are of split or two-piece type, made of

steel, and highly polished and blued to match the finish of the actions.

The bottom of the receiver is flat, with a recoil lug at the front end. The repeating action bottoms are open to accept a magazine box. The loading port on the original L46 action made for the 22 Hornet and 218 Bee is 1.812" long. The rear of the receiver ends in a narrow tang that is grooved to accept the bolt sleeve and the cocking cam lug on the cocking piece.

The front end of the receiver is threaded for the barrel shank. On the original actions the thread was listed as being "Whitworth standard .080-16." The breech end of the barrel is flat except for a sloped extractor cut. (See Sako barrel shank specification drawings at the rear of this book).

The one-piece bolt is machined with utmost precision and highly polished, and has dual opposed locking lugs on the extreme front end. These lugs engage behind shoulders milled inside the receiver ring, securely locking the bolt against the breech end of the barrel. The right (bottom) lug is solid, while the left (top) lug is slotted lengthwise to allow passage of the ejector. The recessed bolt face (about .065" deep on most models) encloses the entire rim of the cartridge except for the narrow space which the extractor hook occupies.

The spring-steel extractor, long and narrow, fits in a groove milled lengthwise in the front end of the bolt. Part of this groove is a dovetail to hold the extractor in the bolt. A lip under the extractor engages a hole in the bolt head, which prevents the extractor from pulling out, unless the hook end of the extractor is purposely misaid.

The bolt handle, at the extreme rear end of the bolt, is made as an integral part of the bolt. The base of the bolt handle forms a heavy collar around the rear end of the bolt. This thick collar around the slender bolt provides extra

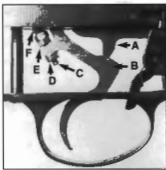
(Above) Using the Sako L46 Heavy Barrel action in 222 caliber the author made a stock for it for a customer. This was in the early 1950s when white line spacers were in vogue.

PART II: Commercial Rifles & Actions

metal for several functions: 1) to provide a wide surface for the cocking cam notch, which prevents wear and makes cocking and raising the bolt handle easier and smoother; 2) to provide metal so that part of this collar can be formed into a cam matching the slope on the rear of the bridge to supply the primary extraction power; 3) to provide enough metal to seal off the left locking lug raceway.

A notch, cut into the receiver tang for the root of the bolt handle, forms the third or safety lug. The bolt handle is at a right angle to the bolt, its tapered stem ending in a hollow round grasping ball. This ball has a narrow band of checkering around it for better grasping. The top of the stem is positioned—and dished out—so that it will clear the eyepiece of the lowest-mounted scope.

The Sako bolt is a guide-rib strip as wide and thick as the right locking lug. It is attached to the bolt body by a small spring-steel collar with hooked ends, these engaging a mortise in the underside of the guide rib. A pin through the guide, behind the hooks, prevents the guide from slipping off the ring. The guide rib lies in the space between the bolt handle and right locking lug. In an oblong milled hole near the center of the underside of the guide rib is a small steel wedge and a small bent leaf spring. When the bolt is closed, the guide rib extends a short distance into the right locking lug raceway, in both the receiver ring and bridge; when the bolt is rotated open, a notch, milled in the underside of the bolt body, moves under the stop wedge in the guide rib to halt bolt rotation. This accurately aligns the right locking lug with the guide rib so that the lug cannot hang up on the receiver when the bolt is operated. It also prevents the bolt from binding during its rearward and forward travel if undue upward pressure is exerted on the bolt handle. When the bolt is closed, the guide rib also effectively closes the openings of the right lug raceway. Almost all other Sako actions have bolts of similar construction and all are made with



Sako L46 trigger showing: (A) sear, (B) trigger, (C) trigger stop screw, (D) trigger stop-screw lock nut, (E) trigger-adjustment jam nuts, (F) trigger spring. This trigger is adjustable for weight of pull and over-travel.

the guide rib.

Two gas-escape vent holes are provided in the L46 action. One is in the left side of the receiver ring at the junction of the head of the bolt and breech face of the barrel. In the rare event of a ruptured case head or primer, much of the gases would escape at this point instead of flowing rearward down the left locking lug raceway. The other hole is in the body of the bolt, forward of the shoulder on the firing pin. When the bolt is closed this hole is positioned under the front end of the guide rib, which in turn has a matching hole through it so that any gases getting into the bolt through the firing pin hole will be vented out to the right. All other Sako actions follow this system.

The bolt is drilled from the rear for the one-piece firing pin, a firing-pin design retained in all later Sako action models. The flattened rear end of the firing pin fits a matching hole in the bolt sleeve. This prevents the firing pin from turning. The mainspring, surrounding the firing pin, is compressed between the bolt sleeve and a collar on the front of the pin. The cocking

piece is fitted to the rear end of the firing pin on a single interrupted lug or collar. The bolt sleeve has a stem which fits inside the bolt body; it also has a hook extending forward which engages over the collar on the rear of the bolt body to hold the entire firing mechanism in the bolt. Cocking occurs on opening the bolt.

There is no separate bolt sleeve lock, but the bolt sleeve is prevented from turning when the bolt is open by the nose of the cocking piece cam resting in the shallow notch in the rear of the bolt. This system is used in all later Sakos.

The rotary safety is fitted at a right angle through the flat top of the bolt sleeve, rotated to the rear it locks both striker (the striker combines firing pin and cocking piece) and bolt.

A combination "cocked" indicator and bolt lock, fitted into a lengthwise hole in the bolt sleeve, is connected with the safety; with the action closed, when the safety is rotated back to the Safe position, the safety stem locks the striker back and moves the bolt lock forward to lock the bolt. With the safety swung forward into the Fire position, the rear end of the bolt lock, which has a red band around it, extends from the rear of the bolt sleeve to indicate the safety is in the Fire position.

The bolt-stop housing, a machined steel box mortised into an opening in the left side of the receiver bridge, is held in place by a set-screw threaded through the housing and into the receiver wall.

The one-piece combined bolt-stop/ejector is held in place in the bolt-stop housing by—and pivots on—a pin through this housing. It is tensioned by a small coil spring. The bolt is stopped in its rearward travel when the left locking lug contacts the bolt-stop. The fired case or cartridge is ejected to the right when the ejector—merely a thin extension of the bolt-stop—projects into the bolt face recess through a groove provided for it through the locking lug. Pressing a serrated button on the outside of the bolt-stop housing allows the bolt to be removed. Roughly the same design of bolt-stop/ejector is used on all later models of the Sako actions.

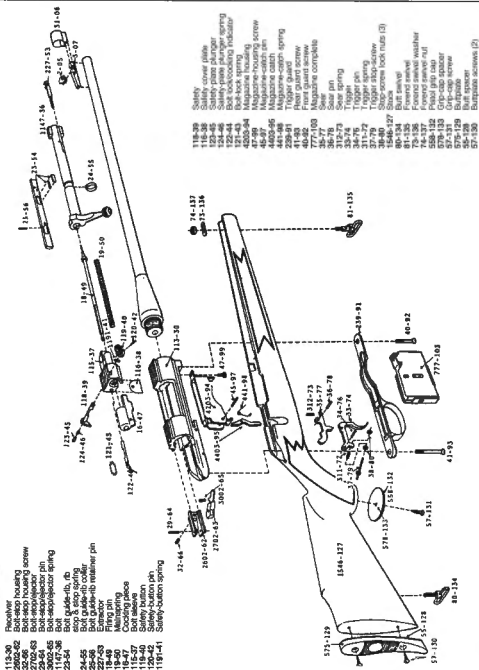
L46 actions were fitted with a trigger and sear which nearly duplicated those of the M70 Winchester action. The sear, positioned in a groove in the bottom of the receiver tang, is held in place by, and pivots on, a pin. It is tensioned by a coil spring compressed between the receiver and the front end of the sear. The trigger, positioned in the rear of the tang groove, also pivots on a pin. A simple spring, plunger and lock nut arrangement between the trigger and the end of the tang provides the tension to engage the trigger with the sear; it also provides a means to readily adjust the trigger for weight of pull and over-travel. Like the M70 trigger, this Sako trigger has proven reliable.

When first introduced, and for a few years afterward, the L46 trigger guard was made



Sako L46 action.

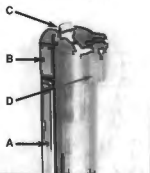
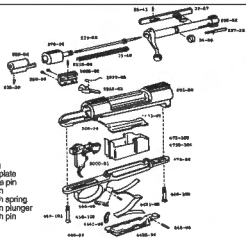
Parts Legend Sako L46 Vroom



Parts Legend Sako L461 Vbom

- 201-30 Receiver
- 2503-82 Bolt-stop housing
- 320-86 Bolt-stop housing screws (2)
- 2352-83 Bolt-stop/ejector
- 2222-85 Bolt-stop/ejector spring
- 2212-84 Bolt-stop/ejector pin
- 202-32 Bolt
- 22-37 Bolt guide-rib
- 24-39 Bolt guide-rib collar
- 25-41 Bolt-rib retainer pin
- 227-35 Extractor
- 278-33 Bolt sleeve
- 229-34 Cocking piece
- 213-38 Firing-pin lock screw
- 218-36 Firing pin
- 19-40 Main spring
- 3000-51 Sako No. 4 trigger
- 306-54 Trigger pin
- 470-99 Trigger guard
- 449-101 Rear guard screw
- 448-100 Front guard screw

- 4411-92 Follower
- 4732-104 Magazine box
- 4421-93 Follower spring
- 4422-94 Magazine floorplate
- 443-95 Floorplate hinge pin
- 4442-96 Floorplate catch
- 446-98 Floorplate catch spring
- 460-102 Floorplate catch plunger
- 445-97 Floorplate catch pin



Sako bolt head showing: (A) guide rib, (B) right locking lug, (C) extractor, (D) left locking lug, which is slotted for the ejector.

General Specifications

- Type.....Turnbolt repeater
- Receiver.....One-piece machined steel, unslotted bridge. Integral scope-mounting bases on bridge and ring.
- Bolt.....One-piece with dual opposed forward locking lugs. The handle base forms the safety lug. Low-profile handle for low scope mounting. L461 Finbear bolt has third locking lug at rear of bolt.
- Magazine.....L46 action has single-column 3- or 6-shot detachable box magazine. All others have non-detachable staggered-column magazine with hinged floorplate. Five-shot in standard calibers. Four-shot in belted magnums.
- Trigger.....Single-throw, adjustable for weight of pull and over-travel.
- Safety.....Early L46 has rotary type on left side of bolt sleeve, which locks striker. Late L46 and L57 actions have rotary type on right side of bolt sleeve, which locks striker and bolt. L461, L579 and L61 actions have side tang safety as part of trigger mechanism locking trigger and bolt.
- Extractor.....Rotating spring-type mortised in bolt head of L46 and L461 actions. Other Sako actions have short hook-type fitted into bolt head and tensioned by a spring and plunger.
- Bolt-stop.....Mannlicher-type pivoted in a housing attached to left side of receiver. Bolt is stopped by left locking lug contacting the bolt-stop.
- Ejector.....Integral with bolt-stop.
- Ignition.....One-piece firing pin powered by coil mainspring. Cocks on opening

Dimensional Action Specifications

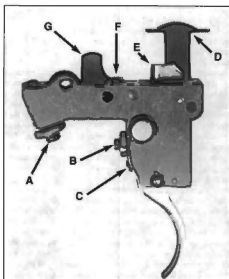
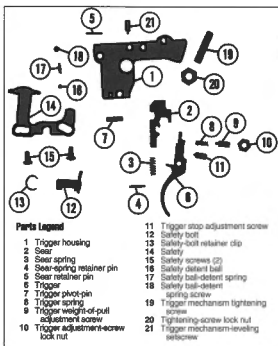
	L46	L461	L57 & L579	L61
Weight (approx.)	32 ozs.	34 ozs.	40 ozs.	44 ozs.
Overall	7.062"	7.062"	7.575"	8.375"
Receiver ring dia.	1.175"	1.175"	1.300"	1.350"
Body bolt dia.	.553"	.553"	.600"	.685"
Bolt travel	2.925"	3.000"	3.750"	4.836"
Striker travel (approx.)	.243"	.300"	.375"	.360"
Bolt face recess:				
Depth	.055"	.055"	.080"	.100"
Diameter	.352" (22 Hornet)	.390"	.478-.482"	.478" (30-06)
	.410" (218 Bee)			.537" (Magnum)
	.380" (.222 & .222 Mag.)			

from a piece of strap-iron bent into shape. It was suitably machined and polished to match the excellent finish on the exposed parts of the receiver. Slotted, oval-head, countersunk

screws, going through holes in the ends of the tang and threaded into the recoil lug and guard of the receiver, hold the action and barrel securely in the stock. A piece of slotted sheet

metal filled the space in the bottom of the stock around the trigger. A long rectangular hole cut into the front of the guard allowed the box magazine to be inserted and removed; the thin side rails of the opening in the guard are indented enough to permit grasping the magazine with thumb and forefinger. After a couple of years, this strap-iron guard was slightly modified to improve its looks somewhat. A real improvement in the L46 guard came several years later, about when the Sako Forester was introduced (1958), in the form of a machined steel guard. At the same time, these machined guards were made available separately so that owners of the older L46 Vixen rifles could replace their strap-iron guards.

The detachable sheet metal single-column box magazines used in the L46 Vixen action were extremely well made. These held three



Late model Sako trigger mechanism showing: (A) mechanism-tightening screw and lock nut, (B) weight-of-pull adjustment screw and lock nut, (C) trigger stop adjustment screw, (D) safety, (E) sear, (F) trigger leveling screw, (G) bolt lock (part of safety). Limited weight-of-pull adjustment can be had by turning screw (B) counterclockwise for lighter pull, and vice versa.

cartridges, and could be readily disassembled for cleaning by sliding off the floorplate.

A sheet metal box-like holder, attached to the underside of the receiver and extending down to the trigger guard, guided and positioned the magazine in the action. A spring-loaded magazine catch in the rear of the magazine holder, with the end of the latch extending into the front of the guard bow, holds the magazine in place and allows it to be removed.

As noted, Sako L46 rifles were first made only in 22 Hornet and 218 Bee. When Remington introduced the 222 in 1950, Sako quickly adapted the L46 action to handle it. They made a longer magazine, lengthened the magazine port to 2.125", and changed the bolt-face recess and extractor as required. The Sako 222 was announced in 1951, in the original action with left-hand safety. Shortly afterward, the bolt sleeve was modified and the safety placed on the right side, where most shooters like to have it.

Before the Sako L46 actions, barreled actions and rifles were discontinued (about 1963), and replaced by the L461 models, they were also offered in 222 Magnum.

Adapting the L46 action to handle the 222 Magnum crowded things a bit, to the degree that a loaded cartridge could not normally be ejected. Incidentally, owners of L46 rifles in 222 should not have them rechambered for

the 222 Magnum—it isn't practicable.

The L46 rifles were made in three styles: Sporter, Mannlicher-stocked sporter and heavy-barreled varmint rifle. The Sporter was also made in a Deluxe version, with extra-fancy stock and engraving on the trigger guard. They were popular rifles, and many shooters hated to see the L46, with its handy detachable magazine, discontinued.

The Sako L57 Forester

In 1955 Winchester and Remington each introduced new combination varmint/deer cartridges which were to be heralded, praised and accepted by rifle shooters the world over. Remington's new cartridge was the 244, while Winchester called theirs the 243. There was great interest in these cartridges from the beginning, and in 1958 Sako offered a new rifle to handle them. This was the L57 Forester, the action made just long enough to handle these medium-length (up to 2.80") cartridges.

The L57 receiver and bolt were essentially the same as those of the L46 action but longer, with a magazine port 2.812" long and a non-detachable five-shot staggered-column magazine box. The L57 also had a different trigger mechanism.

The L57 Sako trigger guard had a hinged floorplate, the latch located in the front of the

guard bow. It was milled entirely from steel, the exposed parts highly polished. As first made, the trigger guard/magazine box was of one-piece construction, but later the magazine box was made as a separate part. It was expertly made from sheet metal, its bottom partly recessed in the front part of the guard; its top, into the receiver magazine well. The follower, also milled from steel, was well polished and had an offset rib to stagger the cartridges in the magazine—for maximum capacity in minimum space. The magazine well in the receiver was milled to leave guide rails or lips at the top sides to hold the cartridges in the magazine, and to guide each cartridge into the chamber, on closing the bolt. This same magazine system is used in all Sako actions made since then.

There were other minor differences between the L46 and the L57 actions besides those just listed. The bolt sleeve was slightly changed, and the firing pin was threaded into the cocking piece and prevented from turning by a small set-screw through the bottom of the cocking cam. This same method is used in the latest versions of all three Sako actions described later on. One Firearms International catalog described this threaded firing pin-to-cocking piece arrangement as providing a means to adjust the firing pin protrusion to obtain positive ignition.

PART II: Commercial Rifles & Actions

Threading the firing pin into the cocking piece is an easy and good way to fasten these two parts together; the set-screw is a suitable means for preventing the firing pin from turning in the cocking piece to prevent a change in the pin protrusion, and it provides a convenient way for the factory to set the firing pin for correct protrusion in assembling the bolt. The proper firing-pin tip protrusion for the Sako rifle is .055" and this should be carefully measured when reassembling the Sako.

The trigger mechanism in the Sako L57 action was essentially like that which Sako first made for the FN Mauser actions except that it lacked the safety. It was attached to the underside of the receiver tang by a single cross pin and tightened in place by a set-screw through the front of the housing, which tightened against the receiver. The sear is in the form of a flat plunger positioned vertically in a hole in the rear of the trigger housing, with its upper end extending through a hole in the tang to contact the cocking piece. A coil spring under this sear plunger keeps the sear up, while a small cross pin keeps it from going too high. The trigger is pivoted at the bottom of the housing on a pin. The upper part of the trigger engages a matching notch in the sear. There are two small set-screws in the front of the lower trigger housing. The upper one holds the trigger spring, and turning it in (for heavier weight of pull) or out provides a limited weight-of-pull adjustment, from about 3 to 5 pounds. The bottom screw, for over-travel stop adjustment, can be set to stop the trigger the moment the trigger is disengaged from the sear.

L57 Sako barreled actions and rifles were first made in 243, 244 and 308 only. The rifles were made in the same three styles as the L46 and in a Deluxe Sporter grade as well.

The L578 Sako Action

In 1960 Sako discontinued the L57 action, introducing a modified version of it which they called the L579. The major change was

in the bolt sleeve, because Sako had adapted this action to accept the Sako No. 4 trigger mechanism with its built-in sliding safety.

The L579 bolt sleeve is rounded and smooth, with a narrow flat matted surface on top. It is fitted and anchored to the bolt by a small rectangular lug on the otherwise smooth extension on its forward end, which fits into a matching milled hole in the rear of the bolt. This is a very good and simple arrangement for fitting the bolt sleeve to the bolt, affording easy disassembly, yet more than ample in strength. Of course, this required some changes to be made in the bolt and receiver, but alterations in no way changed anything in the functioning, safety and operation of these parts compared with the discontinued design.

The bolt-stop housing was also different. Instead of being mortised in the side of the bridge, as on the L46 action, the new housing was affixed by two screws. The bolt-stop/ejector remained about the same, but was tensioned by a bent-wire spring instead of a coil spring. The L461 action also used this new system.

At about this time, Sako introduced a different extractor—a close copy of one used by Savage/Stevens in some of their popular 22 rimfire bolt-action and automatic rifles. A simple hook type fitted in a groove in the bolt head, it's held in place and tensioned by a spring-loaded plunger set into a hole behind the extractor. The same system, but with a heavier and wider extractor, is used in the L61 Sako. The L461, however, has the same extractor as used in the L46.

The No. 4 trigger, similar to the L57 trigger, was improved and made to include a sliding side-tang safety which, when pulled back, locks the bolt and trigger. Since there are a great many of these triggers in use, I'll describe it in detail.

The housing is a machined steel casting. The flat sear plunger, positioned in a vertical hole in the rear of the housing, is held in place by a small cross pin. It is held upward by a coil spring from below, which is held in place by another small cross pin. The trigger pivots in the bottom of the housing on a much heavier

cross pin. The top of the trigger engages a notch in the upper part of the sear when the action is cocked. The trigger is tensioned by a small, but stiff, coil spring held down by a set-screw and locknut positioned in the top front of the lower part of the trigger housing. A limited weight-of-pull adjustment can be had by turning this screw in (for heavier pull) or out, but only to a safe minimum of about 2.5 pounds. The set-screw just below the weight-of-pull adjustment screw is the trigger over-travel stop, which can be adjusted to stop the trigger the moment the trigger releases the sear.

The rotary safety bolt, positioned through the housing to intersect the top of the trigger and effectively block trigger movement when it is rotated to a given stop, is retained in place by a C-spring clip on its left end. The safety slide is fastened on the right side of the trigger housing by two shouldered screws going through elongated holes at each end of the safety, allowing it to be moved back and forth. The front slot is angled so the front end of the safety also rises as the safety moves back. A short projection on the front of the safety, extending through a narrow groove cut through the bottom of the receiver, engages a notch cut into the base of the bolt handle to lock the bolt when the safety is pulled back. A ball-ended lever, riveted on the right of the safety bolt and engaging a notch in the bottom of the slide, causes the safety bolt to rotate when the safety slide is pushed forward or pulled back. A serrated button on the top of the safety makes it convenient to operate. Tension for the Off and On positions for the safety slide is provided by a spring-loaded ball bearing, in the trigger housing, pressing against and falling into shallow holes in the safety. This ball is retained in its hole by a set-screw, and it is possible to change the tension on the safety slide by turning this screw in or out.

The entire trigger mechanism is attached to the receiver by a single cross pin through holes in the upper part of the housing and through a lug on the receiver. A long set-screw with lock nut, passing through the front of the housing, is used only to tighten the mechanism to the receiver. Another set-screw in the top of the housing, used to adjust the trigger mechanism level with the receiver, can also be used to adjust the amount the sear projects through the receiver, and the height of the safety button over the edge of the stock. Normally, this set-screw should be adjusted to leave the top of the trigger housing nearly parallel with the bottom of the receiver when the front screw is tightened.

When first introduced, the L579 barreled actions and rifles were made in 243, 244 and 308 calibers. The 244 caliber was soon dropped. Later on, the L579 Sako became



Sako L579 Forester action. Except for length, the L461 and L61 are the same as the L579.

view drawings of these actions are studied), it differs from the L579 only as follows: 1) The bolt has three locking lugs, and the base of the bolt handle serves as the safety lug. As on the M98 Mauser bolt, the L61 Finnbear bolt has its third lug on the rear part of the bolt body, which engages a locking shoulder recess cut into the bottom of the bridge. Again, as on the M98, this third lug is only a safety lug and is not in contact with its locking shoulder. 2) The bolt guide rib on the L61 is held in place by two collars instead of one, and the stop wedge is located between the collars. This rib extends between the front locking lug and the rear safety locking lug.

The L401 Vixen Action

In 1963-64, Sako redesigned their original L46 Vixen action. In bolt-action repeating rifles, the trend was definitely toward the staggered-column magazine with a hinged floor-plate, so the L46 action was fitted with such a system. At the same time they fitted the action with the No. 4 Sako trigger mechanism and safety, and replaced the box-like bolt sleeve with the round one used on the L579 and L61 actions.

Sako L461 barreled actions and rifles were made only in 222, 222 Magnum and 223. By going to the staggered-column, non-detachable box magazine on this short action, more room was available for the 222 Magnum and 223.

This meant Sako had, and still has, three distinct sizes and lengths of turnbolt actions made for three different families of cartridges. Except for length and diameter, the L461, L579 and L61 actions are essentially alike, all having the same trigger, bolt-stop/ejector, bolt sleeve and magazine systems. (See the action specification chart for the dimensional differences.)

Sako L461 rifles were made in Standard Sporter, Deluxe Sporter, Mannlicher-type Carbine and Heavy Barrel models.

The Sako L468

Thanks to the information sent me by Mims Reed, who is a Sako student and collector, I can fill you in on this rare model Sako. Mims Reed has also given me additional information about the Sako firm and a thumbnail listing of the various Sako bolt-action rifles they produced, along with production dates (see the end of this chapter). And for those of you who collect Sako guns, there is an organization for Sako collectors.

Yes, Sako did produce a model known as the L469 and it was so marked. The Sako L46 action was originally made for the 22 Homet and the 218 Bee cartridges. Then, when the 222 was introduced in 1950, Sako simply altered this action to handle it, crowding this small action in so doing. Then along came the 222 Magnum, a longer cartridge than the 222, and Sako found that the L46 action was just too short to handle it. So what did they do? They reworked the L46 action again, but this time changed it enough so that they were obliged to give the action a new model designation, namely the L469. According to Mims, the L469 in 222 Magnum caliber was made from 1959 to 1967, in which time approximately 11,185 were manufactured. They were made in the Sporter and Heavy Barrel models, and probably also in the Carbine model with Mannlicher stock.

Single Shot Benchrest Action

In 1956-57, to meet the demands of the target shooter, Sako announced that the little L46 action would be available as a single shot—that is, without the magazine-well opening—leaving the bottom of the receiver solid. They called this the "Benchrest" action because it was benchrest shooters who had pressured them the most for a more rigid action.

The more rigid action was better suited to supporting a heavy, free-floating barrel, hence such a rifle would probably show better accuracy than one so built on the repeater action. The flat-bottomed receiver also offered a greater bedding area, and leaving out the magazine opening in the stock made the stock more rigid around the action.

Shortly after the medium-length Sako L57 was introduced, a Benchrest L57 action was made available. It also had a solid-bottom receiver.

On both actions the trigger guard was made with a long forward tang extension, long enough so that the front guard screw could pass through a hole in its end. These actions weighed about the same as their repeating counterparts.

Later, when the L461 and L579 actions were introduced, they were also made in the Benchrest version. To my knowledge, the L61 Finnbear action was never made in single shot benchrest style.

In building a first class varmint rifle on a Sako action, many shooters, including myself, prefer to use the single shot action. For reasons already mentioned, the single shot rifle will probably be consistently more accurate from one hunting trip to the next, especially so if the barrel is free-floating.

Sako Models Listed In 1984 Shooter's Bible Sako Catalog

Sometime in the 1970s Sako adopted a new designation system for their three actions. The short action became the A1, the medium, A2, and the long action became the A3. This designation system lasted a few years and then was dropped. In the 1994 *Shooter's Bible* (after Garcia Corp., Stoeger became the sole importer of Sako rifles, and then Sako bought out Stoeger) listing all of the Sako rifles, barreled actions and actions there is no mention at all of a Vixen,

Sako L579 Forester action open.



PART II: Commercial Rifles & Actions

Forester or Finnbeir, and no mention of A1, A2 or A3. In this catalog the three actions became the short, medium and long actions. However, beginning sometime after the name and number designations were dropped, Sako gave names to their different styles of rifles. Some styles were built on all three actions, others on only two actions and others still on only one action. I will list these different styles starting with the lowest-priced one in the 1994 catalog, along with the catalog description of each:

TRG-S Model—The new TRG-S was designed around Sako's highly sophisticated and extremely accurate TRG-21 Target Rifle. The "resistance-free" bolt and precise balance of the TRG-S are only the first features that attract the attention of the shooter. Closer inspection reveals the three massive locking lugs and a short 60-degree bolt lift. Perhaps unnoticed but of critical importance is the cold hammer-forged receiver—unparalleled for strength and durability. The detachable five-round magazine fits securely into the polyurethane stock. The stock, in turn, is moulded around a synthetic skeleton that provides additional support and maximum rigidity. Sako's new TRG-S sporter model combines the needs of today's shooter with Sako's expertise. The result is superior accuracy, reliability and value—just what you have come to expect from Sako. Made only in the long action in various calibers.

Hunter Model—The Hunter model is ideal for the shooter who demands all of the Sako quality features at a reasonable price: the choice of three different action lengths, cold-hammered barrel, and a European walnut stock protected with a soft, matte lacquered finish. The adjustable trigger is a rifleman's delight—smooth and crisp. Made in three action lengths and wide variety of calibers, left-handed models also made. Made in the following calibers: on the short action, 17 Rem., 222 Rem. and 223 Rem.; on the medium action, 22-250 Rem., 243 Win., 308 Win. and 7mm-08; and on the long action, 25-06 Rem., 270 Win., 280 Rem., 30-06, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., 300 Weatherby Mag., 375 H&H Mag. and 416 Rem. Mag.

Classic Grade Model—Designed for the knowledgeable shooter who demands Sako quality with the clean, graceful lines of the classic style. Made in two action lengths and most popular calibers. Left-hand model also made.

Mannlicher Style Carbine Model—This Sako has an 18½" barrel and is stocked in the Mannlicher style with the forend extending to the muzzle. It has an oil-finished walnut stock and open sights, and is made on the medium and long actions in calibers 243, 308, 270, 30-06, 338 Win. Mag. and 375 H&H Mag.

Laminated Model—The Sako rifle has a stock made of 36 layers of 1/16" hardwood veneers, resin-bonded under high pressure. It is made on either medium or long actions in a

variety of calibers.

Varmint/PPC Model—Sako does not simply screw on a heavier barrel and call it a Varmint rifle. The entire rifle is designed and built as a Varmint rifle. The beavertail forend is extra-wide and provides added steadiness when using sandbags or makeshift field rests. It is made in all popular calibers in the short and medium action lengths. Both the 6 PPC USA and 22 PPC USA enjoy the reputation of being the world's most accurate cartridges—a claim made not by the factory, but by the many shooters in the winner's circle! It is made on the short action in both single and multiple shot versions.

Deluxe Lightweight Model—All the fine features you expect of the Deluxe Grade Sako are here—beautifully grained European walnut, elegant high-gloss finish, hand-cut checkering, fitted palm swell and rosewood forend tip and grip cap. Complementing these features is the high-luster, deep rich bluing of both the barrel and receiver. And, of course, the accuracy, reliability and superior field performance for which Sako is so justly famous are built into each rifle. It's all here—just what one expects from Sako. Made in three action lengths and a wide variety of calibers, as well as a left-hand model.

Fiberclass Model—The Fiberclass is a highly accurate centerfire rifle for the serious hunter who understands that a rifle must maintain its zero under rough usage and exposure to the ravages of the elements. The Fiberclass stock won't shrink, swell or warp, so it doesn't change zero with the weather. And it is lighter and far stronger than wood. The Fiberclass's barreled action carries a non-reflective matte blue finish to complement the stock's black, crinkled finish. Made in a wide variety of calibers in the long action.

Super Deluxe Model—The Super Deluxe is crafted by Sako artisans who design and create a rifle for only the most discriminating shooter. The flawless workmanship of the Finnish technicians is evidenced not only by the engraved stock, but also the deep blue luster of the metal surfaces and the embellishments on the rifle itself. Firearms of this quality are thought of as investments, since traditionally they increase in value over the years. The Super Deluxe truly exemplifies Finnish craftsmanship and is made in your choice of actions and calibers on special order.

Safari Grade Model—The initial examination of this Safari Grade model conjures up visions of far-off places and the famous hunters who roamed the safari regions. Specially selected European walnut, the express quarter rib, and extended magazine, full hooded front sight and the special "matte" bluing are only a few of the many features found on this professionally styled rifle. Reliable and accurate, the Safari Grade model is made in the long action length for belted magnum calibers 338 Win. Mag., 375 H&H Mag. and 416 Rem. Mag.



Top view of the Sako L579 Forester action.

TRG-21 Model—Sako, known for manufacturing the finest and most accurate production sporting rifles made, takes great pride in presenting the ultimate in a short-shooting system: the TRG-21 Target Rifle. This unerringly accurate rifle has been designed for use when nothing less than total precision is demanded. The cold hammer-forged receiver, the "resistance-free" bolt, the stainless steel barrel and fully adjustable polyurethane stock are only a few of the features that bring this rifle worldwide acclaim. Also made with appropriate optional accessories. It is made on the medium action in 308 caliber.

Action Changes

Some changes had been made on the Sako actions since the first publication of this book. A careful comparison of the illustrations will point out some of these. Minor alterations were made in the trigger mechanism and to the trigger housing. Other minor changes were made to the trigger guard and magazine assembly, one of which was the adoption of a new floorplate release. The



Left-side view of the Sako Forester action.

extractor was modified and improved to make it stronger. The most noticeable change was in the design and construction of the bolt sleeve. Its adoption also caused some changes to be made to some parts of the firing mechanism. This was to enclose the bolt sleeve, or, in other words, to make it a shroud that fully encloses the cocking piece. This new and improved shroud provides better protection to the shooter should any powder gases enter the bolt through the firing pin hole. A tail on the cocking piece serves as a cocking indicator.

Another modification not seen on a closed action is the absence of the third locking lug on the A3 action. As shown in an illustration, this lug was located on the rear of the bolt and was not too unlike the third lug on the Model 98 Mauser bolt. This lug served as a safety lug, along with the root of the bolt handle, as it did not actually make contact with the receiver to help lock the bolt forward. Just why Sako decided to do away with this lug on their A3 action is something I can only guess at, but, because it served only as a safety lug, something that the root of the bolt handle did as well, and perhaps because machining the bolt and the receiver to include it was difficult, the Sako people figured it was not needed or worth the effort to make it. Anyway, I always thought that this extra lug was a good idea in rifles chambered for the large magnum cartridges.

Although this is not a change as yet for all Sako actions, in the 1994 catalog there is one action described as having three locking lugs with a 60-degree uplift of the bolt handle on opening the action. Another even more interesting bit of information is that on two of the models, the receiver is a hammered forging. Will these two features become standard on more or all the Sako actions in the future?

Comments

All Sako rifles I've examined were particularly well made and finished. Sometimes the wood was not of best quality, but wood and metal were always well finished and closely

joined. All of the Sako rifles I've tested for accuracy were also highly accurate, and this included most of the early models and several calibers. All receiver and bolt parts are precisely machined from steel and closely fitted, the outside surfaces smoothly and evenly polished. Exposed trigger guard/magazine parts are also highly polished.

I have never seen a Sako action that failed in any way, or developed excess headspace after long use. I assume that the bolt and receiver, as well as most of the other essential working parts, are made of the finest steels available anywhere, and that all parts are properly heat-treated for maximum strength and durability. I have seen a few Sako rifles which, subjected to firing heavy handloads, took this beating as well as if not better than any other actions I've seen in the same calibers. I have never witnessed a case of primer failure in these actions, but I believe the shooter would be as fully protected from escaping gases behind the Sako action as behind most other actions.

There are a lot of things I like about the Sako actions beside their being so well made, finished, strong and safe. I like the small diameter of the bolt and receiver, since I see no advantage in an action having a bolt and receiver large and long enough for a belted magnum cartridge if it is used for a much smaller cartridge, like the 222. The short action is no larger than it need be for the 222 family of cartridges. The medium is also just right for the 308 family, and the long is just right for the standard larger cartridges, and that is the way it should be.

I also like such Sako features as the bolt guide rib, one-piece firing pin and fast lock time, bolt-stop system and integral scope mounting bases on the receiver. Incidentally, I don't believe there are any better mounts made for Sako rifles than their own mount rings.

There are, however, a few things I'd like changed. I would like to see another ejector system used, one that would not require a slot cut into the locking lug. A plunger-type ejector built in the bolt head would be preferred.

Even so, the Sako is a first rate action, and one of my favorites.

Other Rifles on Sako Actions

Some commercial arms makers other than Sako have built rifles bearing their own brand name on Sako actions. Marlin was one of the first to do this. They introduced their Model 322 in 1954. This medium-weight rifle, designed for varmint shooting, was built on the Sako L46 Vixen action, then fitted with a stock and barrel by Marlin. Marlin made these rifles for only a few years, probably not later than 1957.

The Model 52 J.C. Higgins was based on the Sako L46 action.

From about 1957 to 1961, Colt also made rifles on the Sako action. Their rifle, the Coltsman, was based on the Sako L57 Forester action, and was chambered for 243 or 308 Winchester. Three grades were available, Custom, Deluxe and Standard.

Browning was the first commercial arms maker to chamber a rifle for the 22-250 cartridge, the date about 1964. The action and barrel used was the Sako L579. The action Browning used differed from the standard Sako model only in that the top of the receiver ring and bridge were left round, then tapped for scope mounts. Browning also used the L579 for their finely finished bolt-action rifles in 22-250, 243 and 308. They also use the L461 action for their 222 and 222 Magnum rifles.

Harrington & Richardson used the L461 Sako action for their Model 317 Ultra rifles. This semi-custom rifle was chambered for the 223, 17/223 wildcat or the 17 Remington. That these firms chose Sako actions certainly speaks well for the brand.

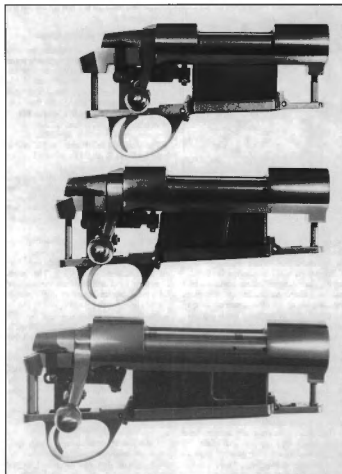
Markings

The words **Made in Finland**, in very small letters, are stamped on all of the Sako receivers I have seen, usually on the flat on the lower left side of the receiver ring. The serial number is usually stamped on the left receiver wall as well as on the bottom of the bolt handle. On some Sako actions, the action number and the city where it was made are stamped on the left receiver wall, thus: SAKO Riihimäki.

On Sako barreled actions and rifles, the name SAKO is usually stamped on the breech end of the barrel, along with **Made in Finland** and the caliber marking.

Takedown and Assembly

First make sure the chamber and magazine are empty. Remove the magazine from the L46 models. On all Sakos, remove the bolt by raising the bolt handle and drawing the bolt back until it stops. Then depress the bolt-stop on the left rear side of the action and pull the bolt free. On all Sakos, to remove the barrel and action from the stock, turn out the rear and



Sako has long made three lengths of actions: the short one for the 222 family; a medium length one for cartridges such as the 22-250, 243, 7mm-08; and the long action for cartridges of 30-06 length and longer. These actions were once known as the Vixen, Forester and Finnbeare and A1, A2 and A3. In 1994, these actions were still available.



Sako original scope mounts. They are of all steel construction and made to fit the integral bases of the Sako actions.

front guard screws in that order. Then carefully remove the trigger guard from the bottom of the stock and lift barrel and action out of the top of the stock. Reassemble in reverse order.

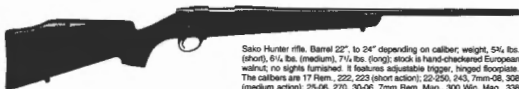
On all Sako models, to remove the bolt guide rib, drive out the small pin from the rib just to the rear of the guide rib collar; then, with the rib turned on the bolt between the locking lugs, push or pry it forward about $\frac{5}{16}$ ". Now, with the bolt held so the rib is down, carefully pull the rib away from the

bolt, being most careful not to lose the rib stop and spring. The spring-guide rib collar can then be spread apart and removed from the bolt. Reassemble the guide rib parts in reverse order, proceeding as follows: Holding the bottom of the rib up, insert the rib-stop spring, curved ends down, in the rib-stop recess; then insert the rib stop, groove side down, over the spring. Place the bolt on the rib and, while carefully holding the front end of the rib against the bolt, with equal care raise the rear end and turn the hooked ends of the rib collar under the rib. Use narrow-jawed pliers to pinch the collar together so the rib can be pressed entirely against the bolt body. Now slide the rib back and re-insert the retainer pin. Do not force anything.

For Sakos with the long spring extractor, the extractor can be removed as follows: Grasp the bolt firmly in the left hand, bolt head up, extractor to the left. Using a narrow-bladed screwdriver in the right hand, place the blade under the extractor hook. Apply pressure to push the hook end of the extractor away from the bolt body and, at the same time, gently pry the screwdriver handle down. When the hook has been raised enough to disengage the lip under the extractor from its recess in the bolt, the extractor will slip forward out of its recess. Reassemble in reverse order.

For Sakos having the latest short extractor, the extractor is removed as follows: Using a small jeweler's screwdriver with sharpened blade, insert the blade between the plunger and the extractor and push the plunger back. While holding the plunger back, the extractor probably can be jiggled out of the bolt, or if you have a free finger on the hand holding the bolt it can be used to tip or flip out the extractor. Reassemble by inserting the spring and plunger with the notched side of the plunger toward the bottom of the extractor recess, depress the plunger fully into its hole with the same tool and then push the extractor into place. Make sure the plunger has properly engaged over the notch of the extractor. The very small extractor parts are easily lost, so work carefully and in a confined area, so that if something goes amiss you'll be able to find the parts.

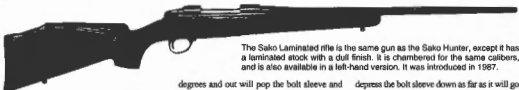
To remove the firing mechanism from either the Sako L46 on L57 bolt, proceed as follows: Put the bolt in the receiver and close it; place the safety upright (in the intermediate position) and carefully remove the bolt from the receiver; next, turn the bolt sleeve counterclockwise as far as it will go, and the firing mechanism can be pulled from the bolt. To disassemble the firing mechanism further, rest the firing pin tip on a hardwood surface and, with a firm grasp on the bolt sleeve, compress the mainspring as far as it will go, then turn the cocking piece $\frac{1}{4}$ -turn in either direction and lift it off. Compressing the mainspring is a two-handed job, so it is best to have someone else handy to remove (and later



Sako Hunter rifle. Barrel 22", to 24" depending on caliber; weight, 5½ lbs. (short), 6¼ lbs. (medium), 7¼ lbs. (long); stock is hand-checked European walnut, no sights furnished. It features adjustable trigger, hinged floorplate. The calibers are 17 Rem., 222, 223 (short action); 22-250, 243, 7mm-08, 308 (medium action); 25-06, 270, 30-06, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., 375 H&H Hag., 300 Wea. Mag., 416 Rem. Mag. (long action).



Sako Deluxe Lightweight rifle. This is the same action as the Hunter except for select wood, rosewood p.g. cap and forend tip. The rifle has fine checkering on the top surfaces of the integral dovetail bases, bolt sleeve, bolt handle root and bolt knob. It has a recoil pad, slip-line checkering and mirror-finish bluing. The caliber choice is the same as for the Hunter model for short, medium and long actions.



The Sako Laminated rifle is the same gun as the Sako Hunter, except it has a laminated stock with a dull finish. It is chambered for the same calibers, and is also available in a left-hand version. It was introduced in 1987.

degrees and out will pop the bolt sleeve and striker. You need a firm grip on the bolt sleeve to do this, and to obtain a firmer grip just wind a couple layers of masking tape around it. To reassemble it, the tape is not needed. Insert the striker assembly into the bolt and turn it so the lug on the bolt sleeve moves into the recess made for it. Now, with the bolt head against something solid, and while grasping the bolt,

depress the bolt sleeve down as far as it will go with the thumb and quickly turn it counter-clockwise. With the cocking piece resting in the shallow full-cock notch, the bolt is ready to be inserted into the receiver.

To remove the safety on the Model L46 and L57, proceed as follows: depress the small plunger in the safety cover plate (which is opposite the safety button) and slide the cover

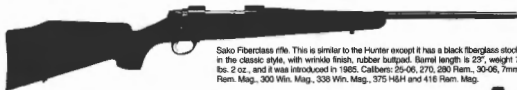
to replace) the cocking piece. The main parts of the mechanism can then be separated.

Late models of the Sako actions have a shrouded bolt sleeve. The shrouded bolt sleeve makes it easier to disassemble the firing mechanism from the bolt. To do this you need to turn the bolt sleeve clockwise only a few

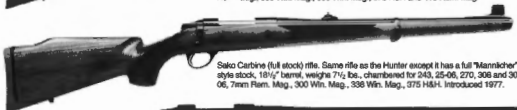


The long Sako action with bolt and floorplate open.

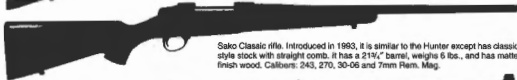
PART II: Commercial Rifles & Actions



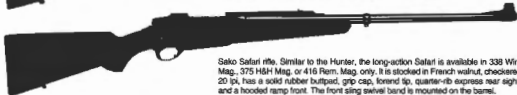
Sako Fiberglass rifle. This is similar to the Hunter except it has a black fiberglass stock in the classic style, with wrinkle finish, rubber butt pad. Barrel length is 23", weight 7 lbs. 2 oz., and it was introduced in 1985. Calibers: 25-06, 270, 280 Rem., 30-06, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., 375 H&H and 416 Rem. Mag.



Sako Carbine (full stock) rifle. Same rifle as the Hunter except it has a full "Mannlicher"-style stock, 18 1/2" barrel, weighs 7 1/2 lbs., chambered for 243, 25-06, 270, 306 and 30-06, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., 375 H&H. Introduced 1977.



Sako Classic rifle. Introduced in 1983, it is similar to the Hunter except has classic-style stock with straight comb. It has a 21 1/4" barrel, weighs 6 lbs., and has matte-finish wood. Calibers: 243, 270, 30-06 and 7mm Rem. Mag.



Sako Safari rifle. Similar to the Hunter, the long-action Safari is available in 338 Win. Mag., 375 H&H Mag. or 416 Rem. Mag. only. It is stocked in French walnut, checkered 20 lpi, has a solid rubber butt pad, grip cap, forend tip, quarter-rib express rear sight, and a hooded ramp front. The front sling swivel band is mounted on the barrel.

plate down and out of the bolt sleeve; remove the safety cover-plate plunger and spring; drive out the small cross pin which holds the safety button on the safety stem, then drive the safety stem out; the cocking indicator can then be removed. Reassemble in reverse order.

To remove the firing mechanism from the L461, L579 and L61 Sako bolts, proceed as follows: Remove the bolt from the rifle; grasp the bolt firmly in one hand and, with an equally firm grip on the bolt sleeve, turn the bolt sleeve clockwise until it snaps loose from the bolt. The firing mechanism can then be taken apart by loosening the firing-pin lock screw in the bottom of the cocking piece and turning the firing pin out of the cocking piece. This can be done by hand without tools, although a screwdriver can be used on the head of the firing pin. Reassemble in reverse order. Reassembling the firing mechanism is not easily done because the very stiff mainspring must be compressed. After inserting the bolt sleeve partly in the bolt, grasp the bolt firmly in one hand and the bolt sleeve between the thumb and crooked forefinger of the other hand, and be ready to turn it counterclockwise; with the edge of the bolt sleeve held against the edge of a workbench or hardwood block held in a vise, depress the bolt sleeve into the bolt to full depth, or until it can be turned to lock it. After

this, turn the bolt sleeve counterclockwise until the cocking piece falls into the shallow full-cock notch in the rear of the bolt. Under no circumstances should the bolt be turned counterclockwise in disassembling it, or clockwise when assembling it; in other words, never turn the bolt sleeve so that the cocking piece falls in the deep cocking notch, for it is then very difficult to turn the bolt sleeve to the cocked position without tools. During the assembly of the firing mechanism into the bolt, if the cocking piece should fall into the cocking notch, then it is best to make a simple tool to turn the bolt sleeve to the cocked position.

Drill a snug 1/8" hole in a piece of hardwood, and notch this hole for the cam on the cocking piece. Holding this tool in a vise, insert the bolt sleeve into the hole, and raise the bolt handle until the cocking piece is cocked and falls into the shallow cocking notch.

To remove the bolt-stop housing on the L46 action, turn out the screw in the front of the housing and slide the housing to the rear. On the other models, turn out the two screws below the housing and lift it from the receiver. After the housing is removed, the bolt-stop pin can be driven out to remove the bolt-stop and its spring. Reassemble in reverse order.

To remove the trigger parts on the L46, merely drive out the trigger and sear pins, and

all the trigger parts can be lifted free. Remove the trigger mechanism from all the other models by first loosening the set-screw in the front of the trigger housing and then drive out the trigger housing pin.

The barrel is threaded into the receiver (right-hand threads) and is usually affixed very tightly. Therefore, unless you have a barrel vise and action wrench, do not attempt to remove the barrel from the receiver.

Brief History and Production

The Sako firm was established in 1921 and the firm name, translated into English, was Arms & Engineering Workshop Of The Civil Guard. It was located in Riihimäki, Finland. In 1931, this name was changed to Oy Sako AB, and this name is still in use. According to Mims Reed, Sako is correctly pronounced "Socks."

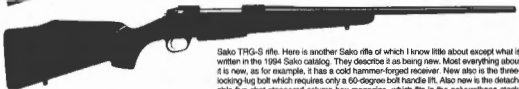
The following is a brief rundown of the various centerfire, bolt-action rifles which bore the Sako name from 1942 to 1972:

1942—Sako L42: The L42 was Sako's first rifle, only a prototype or two were made, and the war stopped further work on it. Made in 7x33mm caliber, this was a clip-loading, light sporter.

1946-1961—Sako L46: This was the first production Sako model, first made in 7x33mm caliber and then in 22 Hornet, 22 Vierling, 218



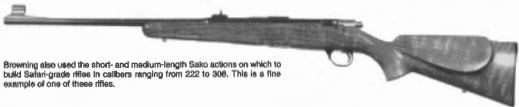
Sako Whitetail/Battue rifle. This Sako rifle is not listed in Sako's 1994 catalog. I would judge it to be a brand new model. I know little about it except what is shown in the photo. One feature shown is the quarter rib on the barrel, on which is mounted an adjustable express sight. It also has a hooded ramp front sight.



Sako TRG-S rifle. Here is another Sako rifle of which I know little about except what is written in the 1994 Sako catalog. They describe it as being new. Most everything about it is new, as for example, it has a cold hammer-forged receiver. New also is the three-locking-lug bolt which requires only a 60-degree bolt handle lift. Also new is the detachable five-shot staggered-column box magazine, which fits in the polyurethane stock. The stock, in turn, is moulded around a synthetic skeleton that provides additional support and maximum rigidity for the free-floating barrel. The recoil pad spacer system allows the stock to be adjusted to virtually any size shooter.



Herrington & Richardson once used the Sako L461 action to build small caliber varmint rifles like this one. This is the H&R M317 Ultra Wildcat chambered for the 223 cartridge.



Browning also used the short- and medium-length Sako actions on which to build Safari-grade rifles in calibers ranging from 222 to 308. This is a fine example of one of these rifles.

Bee and 25-20. Later on, by now called the Vixen, with a slight modification of the action, it was made in 222 caliber. It had a detachable box magazine and was made in Sporter, Deluxe, Heavy Barrel and Carbine styles.

1959-1961—Sako L469: This was the L46 revamped to handle the 222 Magnum. It came in Sporter and Heavy Barrel styles, perhaps Carbine also.

1961-1972—L461: This was an improved version of the L469 made with a non-detachable, hinged-floorplate magazine and in calibers 222, 222 Magnum and 223. Made in Sporter, Heavy Barrel and Carbine models. The name Vixen was given to all the L46 Models.

1957-1959—Sako L57: Called the Forester and using a medium-length action with non-detachable, hinged-floorplate magazine, this model was made in 243, 244 and 308 calibers and in Sporter, Deluxe, Heavy Barrel and Carbine models.

1959-1972—L579 Forester: With some slight improvements over the L57 action, the L579 was made in 22-250, 243 and 308 calibers in Sporter, Deluxe, Heavy Barrel and Carbine models.

1950-1957—Sako High Power Rifle: This Sako rifle was built on the commercial F.N. Mauser action in popular U.S. calibers such as the 270, 30-06, 300 H&H Magnum and 375 H&H Magnum.

1961-1972—Sako L61R Flinnbear: This Sako rifle was built on a longer and stronger version of the L579 action and was chambered for the 25-06, 270, 30-06, 264 Magnum, 7mm Magnum, 300 Magnum, 338 Magnum, 375 H&H Magnum and 458 Magnum. It was made in Sporter, Deluxe and Carbine models.

1972-1973—Sako Presentation L61R: Built to celebrate Sako's 50th anniversary, this rifle featured a carved and checkered

stock of very fancy walnut and engraved and gold-inlaid metal. Only 1000 were made, and in 7mm Magnum only.

1972-1974—Sako Model 72: This was the economy version in the Sako line, and it applied to all three basic action lengths, and to Sporters, Heavy Barrel and Carbine models. The M72 rifles were not polished and blued as nicely as the regular line, nor was the wood and checkering as good. Except for the Heavy Barrel models, the M72s were furnished with open sights. The M72 was replaced by the M74, which generally had better wood and checkering.

The 1994 lineup of Sako centerfire bolt action rifles are listed elsewhere. One centerfire bolt action not listed here is the Sako Model 22 Hornet made from 1979 to 1980.

It should be noted that Sako has made, and is still making, other firearms not mentioned here because we deal only with centerfire turn-bolt rifles.



Savage Model 1920

WHEN THE 250-3000 Savage cartridge was introduced in 1915, it was the first commercial cartridge that achieved a muzzle velocity of 3000 fps. It did this remarkable ballistic feat (remarkable for that time) with an 87-grain bullet. Charles Newton designed this cartridge for Savage for use in the popular Savage Model 99 lever-action rifle. Newton designed this cartridge around a shortened and necked-down 30-06 case and he did a good job of it because it soon became popular. While this was taking place, the Model 1903 Springfield and Model 1917 Enfield rifles in the hands of our soldiers during World War I made the bolt-action rifle popular. So it was only natural that at the end of this conflict that American gunmakers started thinking about putting up-to-date bolt-action sporting rifles on the market. Savage had an excellent sporting cartridge in their 250-3000, and it was logical that they would want to produce a bolt-action sporter to handle it. It was thus that the Model 1920 Savage was born. Savage must have studied the existing bolt-action rifles, putting ideas together—some new and some borrowed—and in 1920 introduced their first turnbolt, repeating, high-powered sporting rifle, the Model 1920. They probably designed it with only the 250-3000 Savage cartridge in mind, and since this cartridge produced little recoil, the rifle was accordingly made very light and sporty. And so it was, becoming one of the sportiest bolt-action, high-powered hunting rifles ever produced.

The Early Version M1920 (1920-26)

Weighing only about 6 pounds, the Model 1920 Savage was extremely light for a high-powered rifle. The round, tapered and nicely contoured barrel was very slim. It appears to have been the same barrel as used on their lightweight Model 99 lever-action rifle. Barrels were made of high pressure steel and the blade-type metal bead front sight was mounted on a small stud ramp made integral with the barrel. The elevation-adjustable sporting

open rear sight was dovetailed into the barrel. No provisions were made for any other types of sights to be used. The one-piece American walnut stock was made on very slender lines. Starting with a serrated and slightly curved steel buttplate only $4\frac{1}{2}$ " long and $1\frac{1}{4}$ " wide, the slenderness continued through the butt section with a thin comb, a long full-curved, but very slender pistol grip, to a graceful swell around the action, and then to a fast tapering and very slender forend which ended in a very distinctive schnable—it was a very trim stock. It was given a varnish finish and small panels of coarse checkering were put on the grip and forend; the pistol grip was capped.

The Mauser-type turnbolt action that Savage designed for this rifle was short and light. It featured dual-opposed locking lugs on the front of the bolt, a long non-rotating Mauser-type extractor, five-shot non-detachable staggered column box magazine that was loaded through the opened action, double-stage trigger pull, sliding tang safety that locked sear and bolt, and a striker that cocked on the uplift of the bolt handle. The root of the bolt handle served as the safety locking lug.

No sooner had the Model 1920 been announced in 250-3000 caliber, than Savage also announced the introduction of their new 300 Savage cartridge, which they said had the ballistics of the 30-06 cartridge. Thus, when the Model 1920 became available it was offered in either the 250 or 300 Savage calibers. The Model 1920 in the 250-caliber had a barrel 22" long, with a muzzle diameter of only .550", making this rifle $41\frac{1}{2}$ " in overall length.

A 24" barrel was used for the 300-caliber. In his big book *The Rifle in America*, Philip B. Sharpe states that a few M1920s were also made in 30-06 caliber. However, I have not been able to verify this, and according to all the information I can find on this rifle it was made only in the 250 and 300 Savage calibers. Col. Townsend Whelen in his book *The American Rifle*, which was written the same year that the M1920 came out, had high praise

for this rifle. He mentions that it was fitted with an aluminum buttplate that had a trap. Otherwise, the M1920 rifle that he describes, and the early version that Sharpe described, fit the description I have given here.

The Late Version M1920-1926 (1925-26)

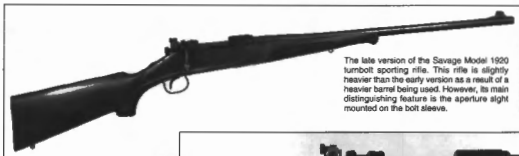
In about 1925 Savage changed the Model 1920 rifle and brought out what they called an improved M1920, the M1920-1926. It differed from the early version in several details, but the most noticeable change was in the rear sight and the weight. To begin, the barrels in both calibers were made slightly heavier and the rear sight dovetail slot was omitted. Then Savage installed a peep sight on the rifle. Several references list this sight as the Lyman No. 54, and although Philip Sharpe described it as a receiver sight, my information has it mounted on the bolt sleeve—thus it was a bolt sleeve sight. The forend of this rifle was made slightly heavier than before, and sling swivel eyelets were installed.

Sharpe states that the checkering pattern was also changed. At any rate, the new rifle was nearly a pound heavier than the first model, and had improved sights. In 1921 the rifle retailed for \$51.50, which was slightly higher than the best standard Model 99 Savage lever-action made at the same time.

Action Details

The one-piece receiver of the M1920 Savage appears to be a machined steel forging. The barrel is threaded into its front end, with the shank threads being of the square type. The breech face of the barrel is flat, and there is no inside collar inside the receiver ring. The breeching is much like that of the Model 93 Mauser. The receiver ring is about 1.75" long and the recoil lug is part of a ring separate from the receiver that is clamped between the

(Above) The Model 1920 Savage (early version) high power turnbolt sporting rifle.



The late version of the Savage Model 1920 turnbolt sporting rifle. This rifle is slightly heavier than the early version as a result of a heavier barrel being used. However, its main distinguishing feature is the aperture sight mounted on the bolt sleeve.

barrel shoulder and the receiver, much like on the Remington Model 700. However, with the M1920, the recoil lug is threaded to accept the front guard screw.

The cylindrical part of the receiver, or the body part, is about 5.50" long, with the loading port being about .25" and the bridge about 1.25". There is a stripper clip slot in the bridge, as well as a notch on the rear right side of the receiver ring, and this increases the actual loading and ejection port. The receiver bridge is also deeply notched out on top and to the right for the root of the bolt handle and this leaves only a very narrow band of metal to bridge the bolt.

The bolt appears to be a one-piece forging which is precisely machined and finished. Opposed dual locking lugs on the front of the bolt engage matching locking lug recesses within the receiver ring and securely hold the bolt when engaged. The handle on the rear of the bolt engages the notch in the receiver bridge and serves as the third or safety locking lug. The right or lower locking lug is solid, while the left or upper lug is slotted for the pas-



The late Savage Model 1920 action. Note the bolt sleeve aperture sight which is adjustable for windage and elevation.

sage of the ejector. The bolt face is recessed for the cartridge head, but part of this recess is cut away as in the M98 Mauser action to allow a cartridge to slip into this recess, and under the extractor hook when a cartridge is fed into the chamber from the magazine. This feature prevents double-loading.

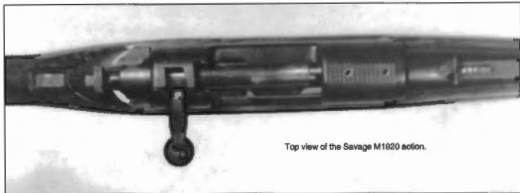
The extractor is of the one-piece Mauser style and is held on the bolt by a two-piece

collar located in a groove in the bolt. The ejector is a simple affair pivoted on a screw in a slot cut into the left side of the receiver bridge. It is not too unlike the Model 1903 Springfield ejector.

The inside of the bolt is drilled, bored and threaded from the rear to accept the firing pin, mainspring and the threaded end of the bolt sleeve. The cocking piece fits into the bolt



The Savage M1920 action.



Top view of the Savage M1920 action.

sleeve and the firing pin is threaded into it from the front, with the coil mainspring compressed between the forward end of the bolt sleeve and the collar on the firing pin. Both ends of the mainspring are bent straight; a short end on the rear engages in a single notch in the front of the bolt sleeve, and a longer one at the front end engages in one of the four notches that are evenly spaced around the collar on the firing pin. The purpose here is to use a slight wind-up tension of the mainspring to keep the firing pin from turning to maintain constant firing pin protrusion.

There is a deep cocking notch in the rear of the bolt and a cocking cam and sear built on the cocking piece, so that on raising the bolt handle the cocking piece and attached firing pin are cammed backward to nearly the full-cock position. There is a shallow notch on the rear of the bolt near the end of the cocking notch surface, and when the bolt handle is fully raised the end of the cocking cam rests in this notch. When the bolt is pulled back, the

cocking cam in this shallow notch prevents the bolt sleeve from turning. There is also a slight angled slope on the upper part of the forward bolt handle notch in the receiver bridge so that on opening the bolt, as the root of the handle contacts and moves over this slope, the bolt is cammed back a short distance to provide camming power for initial extraction. The cocking piece has an integral hollow and knurled head and it has no real purpose or function other than to provide something to grasp in disassembling the bolt.

The trigger guard/floorplate is a one-piece heavy steel stamping and it is inletted flush in the bottom of the stock. Between it and the bottom of the receiver is a sheet steel magazine box. There is the usual magazine follower and W-shaped follower spring, with the lower end of this spring fitted in a slot cut into the floorplate. The trigger guard/floorplate is held in the stock by three screws; a wood screw at the rear of the guard bow; and two machine screws fore and aft of the magazine

box and threaded into escutcheons pressed into the stock. There is also a slotted trigger plate held under the trigger guard bow. The barrel and receiver unit is securely held in the stock by three screws: 1) a forend screw which threads into a block dovetailed into the barrel; 2) a heavy screw which goes through a hole in the front of the floorplate and threads into the recoil lug; and 3) a short screw under the trigger plate which threads into the bottom of the stud that provides guidance to the safety bar.

The rear 3.25" part of the receiver is formed into a sort of tang, and built into it and fastened to it is the safety mechanism. The shotgun-type sliding tang safety is fitted through a slot cut into the tang end. A round stud welded to the bottom of the receiver provides the rear anchorage for the rear guard screw and is slotted on top to admit the safety bar. The rear end of this bar is pinned to the safety button. There is also a pin through the stud which passes through a slot in the safety bar, permitting the bar to move forward and backward.



The sliding tang safety locks sear and bolt.

The sear is positioned in a groove in the bottom of the receiver and is held in place by and pivots on a pin through the receiver. The trigger is pivoted on another pin through the sear. A projection on the rear end of the sear projects upward through a hole in the receiver to engage with the sear on the cocking piece. Tension is given to the sear, trigger and safety by a single U-shaped double torsion wire spring. There is an arm on the front of the safety bar which projects through a hole in the receiver and when the safety is pulled back, this projection engages in a groove in the rear of the bolt to lock it when it is closed. When the action is cocked and the safety pulled back, the front end of the safety bar contacts the rear end of the sear and blocks it.

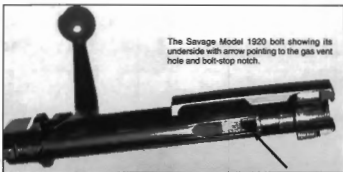
The sear also functions as the bolt-stop. The rearward travel of the bolt is halted when the sear moves up into and contacts the square end of a groove milled in the bottom forward portion of the bolt. There is also a hole at the front squared end of this groove, serving as a gas vent as well as to provide additional abutment surface for the bolt-stop.

The ejector is a simple affair pivoted on a screw in a slot in the receiver wall. It functions just like the Model 1903 Springfield ejector.

Markings

The early Model 1920 Savage rifle is marked as follows: On the top center of the barrel in two lines is:

MANUFACTURED BY SAVAGE ARMS
CORP.
UTICA, N.Y. U.S.A.
—MARCH 28, 1916, DEC. 26, 1916,
JUNE 17, 1917—



The Savage Model 1920 bolt showing its underside with arrow pointing to the gas vent hole and bolt-stop notch.

On the top left side of the receiver ring is:
SAVAGE 1920 MODEL

On the left side of the barrel breech is:
SAVAGE HI PRESSURE STEEL
250-3000

The Savage trademark (Indian in feathered head dress with the words **SAVAGE QUALITY**) is stamped on the toe of the steel buttplate. The serial number is stamped on the left side of the receiver ring, and on the rifle illustrated here this number is 7243.

Takedown and Assembly

To remove the bolt, raise the bolt handle and pull the bolt back as far as it will go, pull the trigger back (with safety forward) as far as it will go, and then withdraw the bolt. It can be replaced again without pulling the trigger back. The firing mechanism is removed from the bolt by pulling the cocking piece back and turning it counterclockwise and unscrewing the bolt sleeve from the bolt. To disassemble the firing mechanism, place the cocking piece on the

workbench, and with thumb and forefinger firmly grasp the front end of the mainspring and pull it away from the notched collar far enough so the spring is clear of it. Then unscrew the firing pin from the cocking piece. The firing mechanism then comes apart. Reassemble in reverse order. Turn the firing pin in until it bottoms, and then adjust the butt tip of the front end of the mainspring in one of the notches in the collar so that the spring holds the firing pin from turning out. The extractor can be removed by rotating it to the bottom of the bolt and then pushing it forward off the bolt. Remove the extractor collar by separating its two halves.

Remove the barrel and receiver from the stock by turning out and removing the two front trigger guard screws, the center guard screw (just ahead of the guard bow) and the rear guard wood screw. Remove the trigger guard/floorplate, magazine box and the trigger plate. Turn out the forend screw and the screw from behind the trigger (this was covered by the trigger plate) and then the barrel and receiver can be separated from the stock. Reassemble in reverse order.



The Model 1920 Savage action, opened.

PART II: Commercial Rifles & Actions

Close-up side and bottom views of the most distinctive Model 1920 forend schnabel.



The trigger and safety parts can be removed by driving out the two pins which hold the safety button and bar, unhooking the safety/trigger spring and removing these parts. Then drive out the sear and remove the sear and trigger. The ejector can be removed by removing its screw from below. Reassemble in reverse order.

The barrel is screwed very tightly into the receiver and it should not be removed unless necessary, and then only if proper tools are available to do the job.

Comments

I have never owned a Model 1920 Savage rifle, and in fact, up to this writing I have only seen two of them. Of these, I had the opportunity to keep the one shown here in my den for a few weeks which gave me a chance to look at it, handle it, study it, and I even got to fire it a few times. I took it all apart and examined every part with a critical eye. This gave me a chance to evaluate it at my leisure.

When the Savage firm decided to build its first high-power turnbolt rifle (they probably started on it in about 1915), they seem to have instructed their designers and engineers to make it simple, short, light and trim, to make the action strong and safe, and to make the action no larger or longer than necessary to handle Savage's two high-power rimless cartridges. Judging from the result of their goals and efforts, it seems to me they did just that. Above

all, they made the rifle very light and trim, and those are the most impressive things about it. If it is not the lightest high-power, commercial, turnbolt rifle ever made, it certainly is a close second. I think Savage overdid it in this respect. As for trimness, almost everything about it is trim, although my definition of "trim" as concerning a rifle may differ from yours. By "trim" I am not only referring to the lightness, handiness and "feel" of the rifle as a whole, but more specifically am referring to the minimum dimensions of the various main components that make up the gun.

For example: A barrel no longer or heavier than needed to provide adequate accuracy and full velocity for the cartridge it is chambered for; and a stock long enough for an adult shooter, strong enough to be fully serviceable, yet minimum in most of its dimensions, especially for a small-handed person. I feel, however, that perhaps Savage went a bit too far in trimming this rifle, especially so in the 300 Savage caliber which produces considerably more recoil than the 250 cartridge. The Savage designers did a pretty good job with the action, too; it's no longer than needed to handle the 300 Savage cartridge; it is quite simple, strong and safe, and reliable in operation. Except perhaps for the scanty and coarse checkering, the entire rifle was well made and finished. With the exception of the pistol grip cap and the stock, everything else is steel,

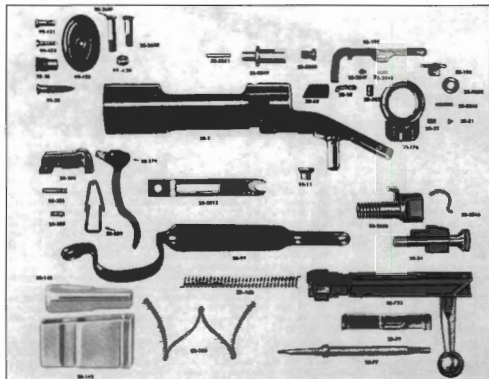
with the major parts all machined.

Several features of the Model 1920 Savage action indicate that its designers were acquainted with, and may have been influenced by, the Mauser and Springfield turnbolt actions. For example, the receiver ring, flat barrel face, bolt head, locking lugs and extractor are more or less of the Model 93 Mauser design. The ejector is of Model 1903 Springfield design. The cocking knob is also Springfield. The rest of the action is more or less original with Savage. The double-stage trigger is a military leftover, but the safety certainly isn't. But, if Savage's designers borrowed a few features from other actions, so did the designers at Winchester borrow something (bolt-stop) from the Savage action when they developed the Model 54 Winchester action in 1925.

Evidently there must have been a number of things about the Model 1920 Savage rifle and action that hunters and riflemen didn't like. For why then did Savage discontinue it at just about the time the bolt-action high-power rifle was becoming popular with American sportsmen? Perhaps the rifle was too light or the caliber choice was too limited. Or maybe with Remington in the bolt-action business and Winchester getting started in it, competition was just too much for the little Savage. Perhaps Savage's own highly popular Model 99 lever-action rifle in 250 and 300 Savage calibers was too much competition for the M1920 to buck, and for lack of sales it was just taken off the market. At any rate, when Savage dropped the gun in 1929, a very interesting rifle ceased to be. They are now mostly collector items, especially those in original and excellent condition. The late model seems to be extremely scarce.



Left-side view of the Model 1920 Savage rifle (early version).



Parts Legend

20-1 Barrel	20-59 Extractor	20-209 Sear Spring	20-737 Stock
20-2 Receiver	20-77 Firing Pin	20-268F Talkdown Screw (Front) (Long)	20-2013 Trigger Plate
99-11 Barrel Stud	20-99 Trigger Guard	20-268R Talkdown Screw (Rear) (Short)	20-2045 Bolt-stop Plunger Pin
20-21 Bolt-stop Plunger	20-142 Magazine Box	20-279 Trigger	20-2046 Extractor Ring
20-22 Bolt-stop Plunger Spring	20-143 Magazine Follower	20-285 Trigger Pin	20-2047 Safety Bar Catch
99-32 Buttplate Screw	20-156 Magazine Follower Spring	99-420 Forend Escutcheon	20-2048 Safety Bar Catch Spring
99-32 Trigger Guard Screw	20-166 Mainpring	99-421 Forend Lug	20-2049 Safety Bar Post
20-34 Cooking Piece	20-170 Recoil Lug	99-422 Pistol Grip Cap	20-2050 Safety Bar Post Screw
20-53 Ejector	20-193 Safety Button	99-423 Pistol Grip Cap Screw	20-2051 Safety Bar Post Pin
20-55 Ejector Pin	20-196 Safety Push Rod	20-522 Recoil Lug Pin	20-2052 Safety Bar Washer
	20-205 Sear	20-733 Bolt	20-2053 Tail Block
	20-206 Sear Pin		

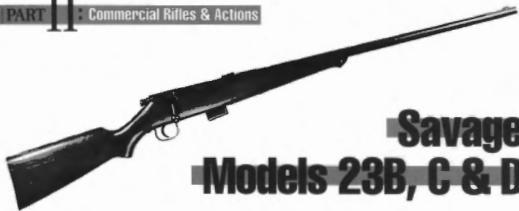
Savage Model 1920

Dimensional Action Specifications

Weight (estimated)	43 oz.
Length	8.750"
Receiver ring diameter	1.425"
Bolt diameter	.700"
Bolt travel	4.025"
Striker travel	.550"
Bolt face recess	
Diameter	.480"
Depth	.150"
Magazine length	2.70"

General Specifications

Type	.....	Tumbolt repeater.
Receiver	.....	One-piece machine steel forging. Separate recoil lug clamped between barrel and receiver.
Bolt	.....	One-piece machined steel with dual opposed forward locking lugs. Root of bolt handle serves as safety locking lug.
Ignition	.....	One-piece firing pin powered by coil spring. 90° bolt lift, cocks on opening.
Magazine	.....	Non-detachable, five-shot, staggered column box magazine.
Trigger	.....	Double-stage, non-adjustable.
Safety	.....	Shotgun-type sliding tang safety locks sear and bolt.
Extractor	.....	Non-rotating long Mauser-type extractor attached to bolt by collar.
Ejector	.....	Pivoting type mounted in rear left receiver wall.
Bolt-stop	.....	Sear doubles as bolt-stop. Bolt removed by pulling the trigger back.



Savage Models 23B, C & D

SAVAGE ARMS CORPORATION introduced their first man-size, 22 rimfire turn-bolt rifle in 1919. Styled as a military rifle with nearly full length forend, its intended use was for target shooting—it had the heft and feel of the Model 1903 Springfield military rifle, a very popular rifle at that time. Named by Savage as the Model 1919 NRA Target Rifle, it was fitted with a receiver sight and a 25" barrel and fed by a five-shot detachable box magazine. Like the Savage Models 03, 04, and 05 rimfire rifles that preceded it a number of years earlier, the Model 1919 had a receiver that was integral with the barrel.

The Model 1919 became quite popular, and this led Savage to develop it further and to bring out a sporter version of it. This was done in 1923 and the rifle designated the Model 23 Sporter. In 22 Long Rifle caliber, it was called the Model 23A.

At the same time, Savage also brought out the Model 23B and 23C, which were centerfire versions of the Model 23A. It is these centerfire rifles that we are interested in here. The B and C models were alike except for caliber, the B chambered for the 25-20 WCF cartridge and the C for the 32-20 WCF. They were not marked with these model designations; the early ones were merely marked Model 23 Sporter. These centerfire sporters were made almost as copies of the Model 23A 22 rimfire Sporter except for a longer action to handle the centerfire cartridges. The B and C rifles had 25" round tapered barrels fitted with plain open sights.

All Model 23 Savage sporters were distinctive rifles. One distinctive feature was the one-piece barrel/receiver unit. Another was the rather long bolt handle that was so positioned that it would not interfere with a receiver sight or low mounted scope on the receiver. Perhaps the most distinctive feature of all was the stock with its tapered forend that ended in a schnable, a style that Savage

had popularized on their famous Model 99 lever-action high-powered rifles. Somewhat similar to the overall outline of the Model 99, the Model 23 Sporter had a smallish buttstock, a generous belly around the action and a quick taper into a slim forend. My very first really good rifle was a Model 23A, and there was nothing about it that I did not like. It was a rugged he-man's rifle, exceedingly well made and finished, reliable and accurate. I used it for years. Later on, I did much shooting with a Model 23D in 22 Hornet caliber, and many years later owned an early Model 23B.

In 1933, the 22 Hornet cartridge was introduced, and Savage quickly realized that this little cartridge would become a star. It did, too. It took the country by storm with Savage helping it along. They did this by modernizing the Model 23 centerfire to handle the Hornet. They lengthened the loading port, magazine well, and magazine to accommodate the 22 Hornet cartridge, which was a bit longer than the 25-20 and 32-20. They speeded up the lock time of the striker, and changed the look and feel of the entire rifle by making the forend longer and fuller and doing away with the schnable tip. From the moment the Hornet chambering was introduced in the Model 23, the sales of these rifles in the other two centerfire calibers went into a decline. In the same year (1933) Savage also dropped the military-styled Model 1919 target rifle and introduced a greatly improved version. This was followed by the Model 19H in 22 Hornet caliber. The Models 23B, C and D were made with 25" barrels and weighed in at just over 6 pounds while the Model 19H had a 29" barrel and weighed about 9.25 pounds. The actions of these rifles were identical, however.

The Action

As mentioned previously, the receiver of this rifle is an integral part of the barrel.

That is, the rear and thickest part of the barrel was machined out to accept the bolt and other action parts. A rather narrow, oval loading/ejection port was machined out on the right side just to the rear of the chamber, and another opening, this one rectangular, was made at the bottom for the magazine. To the rear of the magazine opening, a narrow slot provides an opening for the trigger.

The bolt assembly is about 7.25" long. It is non-rotating. Only the short sleeve to which the bolt handle is attached rotates on the bolt. This sleeve is on the rear of the bolt and it not only holds the turned-down bolt handle but an independent locking lug as well. The receiver is milled out on the right side for passage of the bolt handle, and L-shaped so that the bolt handle root serves as one of the locking lugs. The locking lug is on the rear left of the sleeve, and another L slot machined inside the receiver wall accepts it. More than ample locking engagement is thus provided to hold the bolt in the receiver.

The rear part of the one-piece striker/firing pin is hollow to contain the coil mainspring. A cross pin through a collar and through the bolt body and through a slot in the striker holds the striker in the bolt, and holds the mainspring under tension. Another pin holds the cocking knob in the rear of the striker. Before 1933, the cocking knob was knurled and could be used to manually recock the striker from the fired position. A small projection on the bottom of the striker engages an angled slot in the bolt sleeve, and on the upturn of the bolt handle the striker is drawn back to the nearly full-cock position. Post-1933 models had a shorter

(Above) The early Model 23B Savage Sporter 25-20.



Close-up of the early M23B Savage rifle.

and speedier striker movement than the pre-'33 models. In both models ignition was positive.

The trigger is mounted on a pin in a slot in the bottom of the receiver. A hooked projection on its forward end projects into a slot in the bottom of the bolt and engages with another projection on the bottom of the striker to hold the striker cocked when the bolt is operated. It is the simplest of arrangements but not necessarily an ideal one. The safety is a piece of strap steel half-encircling the rear of the receiver between it and the trigger. A spring and hollow plunger between the trigger and the safety provides tension to both. Raising the serrated lip on the right side of the safety locks the trigger. This too is a simple arrangement and quite good. Pre-'33 models had no provisions to adjust anything about the trigger. On post-'33 models a small screw threaded into the front of the trigger provided a sear engagement adjustment only.

The trigger also served as the bolt-stop. The rearward travel of the bolt was halted when the front end of the trigger engaged with a projection on the front part of the striker. To remove the bolt assembly, the trigger is pulled back and held back as the bolt is withdrawn.

Two extractors are fitted into slots in the front of the bolt. They are held in place by, and pivot on small pins and are provided tension by spring-backed plungers. The extractor in the right side is actually the only extractor while the one on the left side has a blunt hook and serves only to guide the cartridges from the magazine into the chamber, and to assist in ejecting them when the bolt is opened. On the pre-'33 Model 23 centerfire rifles the ejector is an integral part of the rear magazine guide, merely a bent-up projection protruding through a slot in the receiver.

The trigger guard is a heavy strip of strap

iron bent to form a neat guard bow, and with an opening in it for the magazine. It is inletted into the stock and held in place by two wood screws, one at each end. The barrel and action unit is held in place in the stock by two machine screws. The rear one just ahead of the trigger guard bow threads into a stud that is in turn threaded into the receiver, and that holds the rear magazine guide in place; the forward screw goes through the rear part of the forend and is threaded into a barrel stud. There is no flat rear surface anywhere between metal and wood to absorb recoil. The front magazine guide or holder in the pre-'33 model is an L-shaped spring screwed into the stock.

The pre-'33 and the post-'33 Model 23 centerfire rifles had different magazines, not interchangeable, and different magazine retainer parts. The pre-'33 magazine had a round front and a knurled knob below, and both retainer parts were inside the stock. The post-'33 magazine was a rectangular box, and it was retained in the rifle and released from it by a magazine catch which projected below the stock.

Takedown and Assembly

To completely disassemble the Model 23 Savage proceed as follows:

To remove the bolt, pull the trigger back, raise the bolt handle and the bolt can be withdrawn.

To disassemble the bolt, drive out the pin from the collar at the rear of the bolt body. The striker, bolt sleeve and mainspring can then be removed. The extractors can be removed by driving out the small extractor pin. Reassemble in reverse order.

To remove the barrel and receiver unit from the stock, first remove the magazine and then unscrew the two screws from the bottom of the rifle, one that is positioned just ahead of the trigger guard bow and the other at the rear of the forend, and then lift

the barrel from the stock. To remove the trigger guard plate, remove the two wood screws from it.

To remove the trigger and safety parts, drive out the pin that holds the trigger to the receiver. After the trigger is removed, the safety can be removed. The magazine guides and latch can be removed by removing the screws and studs that hold them in place. Reassemble in reverse order.

Markings

The factory markings on the Model 23 Savage centerfire rifles that I have observed are as follows:

On the pre-'33 models the markings on the barrel are:

MANUFACTURED BY SAVAGE ARMS CORP.
UTICA, N.Y. U.S.A.

PATENTED NOV. 28, 1905, SEP. 7, 1915,
SEP. 4, 1917, NOV. 20, 1917.

The serial number is stamped on the barrel breech, and the caliber on the receiver near the safety.

Comments

The Savage Model 23 centerfire sporters, as well as the Model 19H, enjoyed a wide popularity during the years that they were made, and for some years afterwards. Of them, the Model 23D Homet was by far the most popular. Without doubt, the second most popular caliber in this model was the 25-20. The Model 19H is quite rare and almost as hard to find as the Model C 32-20. Many of the Model 23D rifles are still being used. The entire rifle was of rather simple and straightforward design and manufactured with care—it proved to be reliable, rugged and accurate. It was not a fancy rifle, but a good, shootable rifle; it had no alloy or plastic parts, and only walnut was used for the stock. The action was drilled and tapped to accept a receiver sight,



The early M23 centerfire. Savage action.

and in later years it also was tapped for certain scope mounts. It was also one of the first bolt-action rifles ideally suited for scope use, and it was largely the scope on the Model 23D that made it, as well as the Hornet cartridge, so popular.

Savage evidently saw the trend towards the use of the telescopic sight when the '30s rolled around, and wisely designed a better stock for the Model 23 for scope use.

But the Model 23 centerfire had its

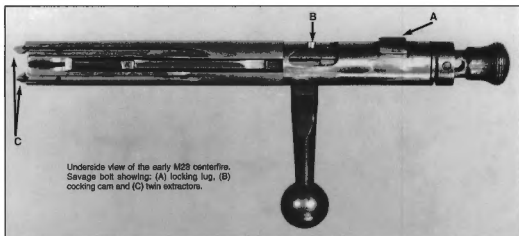
share of undesirable features. A detachable magazine feature is liked by some shooters and cursed loudly by others. The trouble is that magazines are easily lost. The very small ejection port has also often been cursed. It is so small that it cannot be considered a loading port, rather it is only an ejection port. Lose the magazine, and the rifle is not too easy to load as a single shot.

Many Model 23 shooters have wished

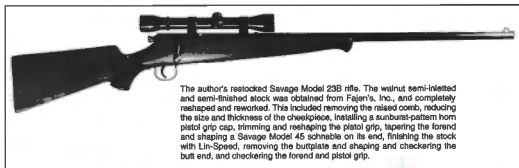
for a better trigger, but no one to my knowledge ever came up with a good commercial replacement for it. The Model 23 was also prone to develop excessive headspace, and I believe this was due largely to the fact that neither the receiver nor the bolt sleeve were hard enough to resist wear. However, I discovered that this problem, when it develops, is quite easily taken care of by making and placing a washer of correct thickness between the bolt sleeve



Left side of the M23 centerfire action, open. The arrow points to the locking lug—the root of the bolt handle is the second locking lug.



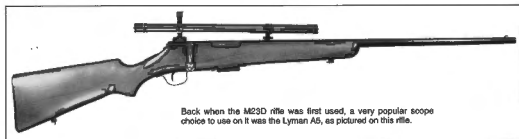
Underside view of the early M28 centerfire Savage bolt showing: (A) locking lug, (B) cocking cam and (C) twin extractors.



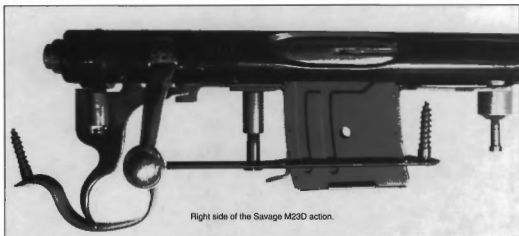
The author's restocked Savage Model 23B rifle. The walnut semi-inlaid and semi-finished stock was obtained from Fajan's, Inc., and completely reshaped and reworked. This included removing the raised comb, reducing the size and thickness of the cheekpiece, installing a sunburst-pattern horn pistol grip cap, trimming and reshaping the pistol grip, tapering the forend and shaping a Savage Model 45 schnoble on its end, finishing the stock with Lin-Speed, removing the buttplate and shaping and checkering the butt end, and checkering the forend and pistol grip.



Savage M23D 22 Hornet rifle minus the original rear sight.



Back when the M23D rifle was first used, a very popular scope choice to use on it was the Lyman A5, as pictured on this rifle.



Right side of the Savage M23D action.



The M23D with bolt lifted.

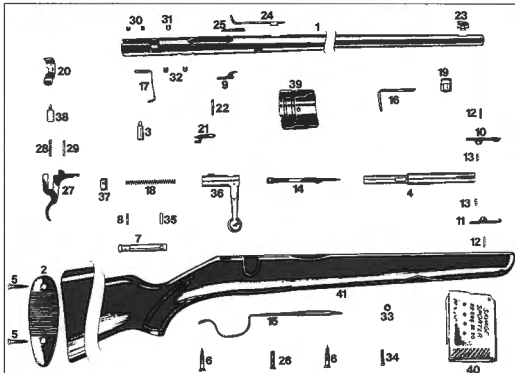
Savage M23 Action (Early Models B & C)

Dimensional Action Specifications

Receiver length	6.250"
Receiver diameter (rear)	.993"
Receiver diameter (front)	.915"
Bolt diameter	.641"
Bolt travel	1.845"
Striker travel	.357"

General Specifications

Type	Bolt-action repeater.
Receiver	Round, one-piece, machined as integral part of barrel.
Bolt	Two-piece, non-rotating, locking lug at rear on bolt handle sleeve, bolt handle serves as second locking lug.
Ignition	One-piece striker, coil mainspring, cocks on closing bolt.
Magazine	Detachable, single-column box magazine.
Trigger	Single-stage, non-adjustable.
Safety	Rotary type, locks trigger.
Extractor	Double claw-type extractors, left one serves to hold cartridge case against bolt face for proper ejection.
Ejector	Stationary, attached to receiver.
Bolt-stop	Trigger doubles as bolt-stop.



Parts Legend

- 1 Barrel
- 2 Buttplate
- 3 Barrel Stud
- 4 Bolt Head
- 5 Buttplate Screws
- 6 Trigger Guard Wood Screw
- 7 Cocking Piece
- 8 Cocking Piece Pin
- 9 Ejector
- 10 Extractor, Left
- 11 Extractor, Right
- 12 Extractor Pins
- 13 Extractor Springs
- 14 Firing Pin
- 15 Trigger Guard
- 16 Magazine Retainer, Front
- 17 Magazine Retainer, Rear
- 18 Main Spring
- 19 Recoil Lug
- 20 Safety

- 21 Sear
- 22 Sear Pin
- 23 Front Sight
- 24 Rear Sight
- 25 Rear Sight Stop
- 26 Takedown Screw, Rear
- 27 Trigger
- 28 Trigger Spring
- 29 Trigger Pin
- 30 Sight Dummy Screw, Small
- 31 Sight Dummy Screw, Large
- 32 Telescope Dummy Screws
- 33 Escutcheon
- 34 Takedown Screw, Front
- 35 Bolt Pin
- 36 Bolt Sleeve
- 37 Bolt Sleeve Retaining Collar
- 38 Trigger Spring Box
- 39 Magazine Assembly (Model 23D-19H)
- 40 Magazine Assembly (Old Style)
- 41 Stock



Close-up of the M23D.

and the bolt body.

Much to the dismay of many Model 23 centerfire owners these rifles were about impossible to rebarrel. About the only way out was to have the Savage factory install a new barrel. What made custom rebarreling impracticable was the one-piece design of the barrel and receiver unit. This feature also made gunsmiths that did barrel relining and reboring shy away from this rifle. And about the only rechambering that could be

done was that of rechambering the 22 Hornet to the K-Hornet, and the 25-20 to the 25S Dean. That was not much of a choice. For the most part shooters of these rifles had to be content with them as they came from the factory, except, that is, for mounting a scope.

I have no information as to how many of the Model 23 Savage centerfire rifles were made, or how many of the old pre-'33 or post-'33 models were made, or how many

were made in each of the three calibers. According to various Savage component catalogs the older Model 23B and 23C were serial numbered below 204,048—this may indicate about how many of the older models were made.

In 1931 the Models 23B and C retailed for \$22.50, and in 1947 the Models C and D were priced at \$52.65, which was just prior to their discontinuance. The Model B had apparently been sold out a year or so before.



Savage Models 40 Sporter & 45 Super Sporter

FOR WHATEVER REASON the Savage firm decided to discontinue their Model 20 high-power bolt-action rifle, they soon replaced it with another bolt-action high-powered rifle of an entirely different design. This was in about 1928. Two models were introduced, a standard model designated the Model 40 Sporter and the Model 45 Super Sporter. The M45 differed from the M40 only in that better-quality wood was used for the stock, the grip and forend were checkered, and the rifle was fitted with a Lyman No. 48 receiver sight. Perhaps because the company was experiencing success with the Model 23 rim- and centerfire sporters, they designed and built their new high-power rifle along its lines. Essentially, that is what the Model 40 is, a longer and beefed-up version of the Model 23.

Shooters who have owned and used both the Model 1920 and the Model 40 or 45 have ever after wondered why the Savage

people replaced the one with the other, most of them arguing that the M1920 was the superior rifle. Be that as it may, the M40 action was the easier one to manufacture, and that may be the sole reason why it was adopted.

The Savage Model 40 Sporter is a turn-bolt repeating rifle featuring a single-column detachable box magazine. It has a one-piece stock with full pistol grip and a slim tapered forend that ends in the Savage-styled schnable. It was made in four popular calibers: 250-3000, 30-30, 300 Savage and 30-06. In the 250 and 30-30 calibers, both the M40 and M45 were made only with 22" barrels, while 24" barrels were standard for the other two calibers. The rifle weighed about 7.5 pounds.

Briefly stated, the M40 has a longer and stronger action than the M23 centerfire to handle more powerful cartridges. Outwardly, other than the noticeably longer action,

the distinctive differences between the M40 and the M23 are the larger receiver diameter and the step between the receiver and the barrel. The "step" stems from the fact that the barrel is threaded into the receiver, unlike the M23 which has the receiver integral with the barrel. Inwardly, the main difference is the stronger locking arrangement to lock the bolt in the receiver. The M40 bolt sleeve has opposing dual locking lugs which engage in matching recesses in the rear of the receiver, as opposed to only one lug on the M23 bolt sleeve. In addition, the base of the bolt handle serves as an extra locking or safety lug.

To describe the Model 40 Savage action further would be more or less of a repeat of my description of the M23 centerfire action in the preceding chapter. The parts are different in size and shape, and the M40 has the greater number of parts, with only one additional action feature. This is the bolt lock—



(Top and above) Two views of the Savage Model 45 Super Sporter.

PART II: Commercial Rifles & Actions

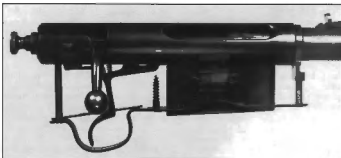


The Savage M40/45 Super Sporter action open.

when the safety is engaged the bolt handle is locked closed.

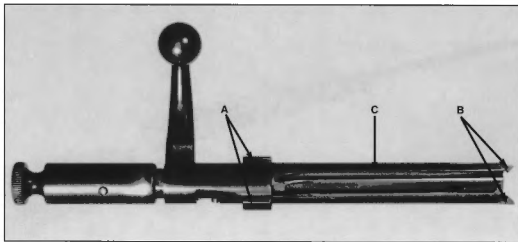
The Savage component parts catalogs point out that some changes were made sometime during the period that the M40 and M45 were in production. This is indicated by some parts being listed for the "old model" and other parts for the "new model." No serial number break-off point is given to separate the two. One of the changes was in the trigger guard and another was in the magazine catch.

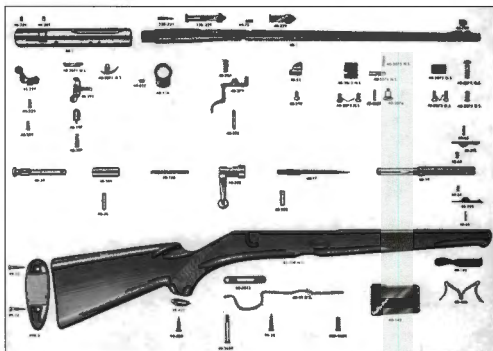
During the many years that I have been interested in rifles, I have seen only two or three of these Savage sporting rifles, I have never owned one and never fired one, nor have I ever talked to a person that has owned and used one. Thus my knowledge of this rifle and its action is very limited. I have briefly handled and examined a couple of



The Savage M40/45 Super Sporter action.

An underside view of The Savage M40/45 bolt showing: (A) dual-opposed locking lugs; (B) twin extractors, and (C) the grooves to override the magazine lips.





Parts Legend

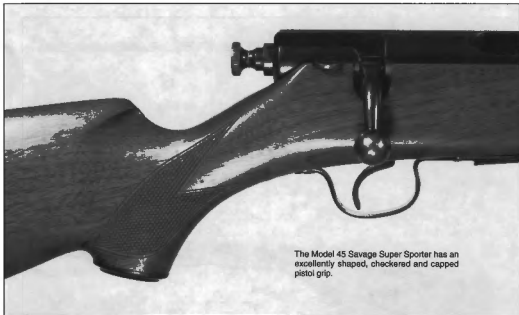
- 40-1 Barrel
- 40-2 Receiver
- 96R-5 Butt Plate
- 40-19 Bolt Head
- Butt Assembly No. 40-734
- 99-32 Butt Plate Screw (2)
- 99-32 Trigger Guard Wood Screw
- 40-34 Cocking Piece (Hammer)
- 40-36 Cocking Piece Pin
- 40-53 Ejector
- 40-59L Extractor, Left
- 40-59R Extractor, Right
- 40-85 Extractor Pin (2)
- 40-68 Extractor Spring (2)
- 99-75 Rear Sight Slot Blank
- 40-77 Firing Pin
- 40-99NS Trigger Guard (New Style)
- 40-142 Magazine Box
- 40-143 Magazine Follower
- 40-156 Magazine Assembly No. 40-735
- 40-166 Main Spring
- 40-176 Recoil Lug
- 40-192 Safety
- 40-197 Safety Plunger
- 40-229 Mobile Sight
- 45-229 Peep Sight and Screws
- 23D-229 Rear Sight for Mod. 40
- 45-231 Rear Sight Base Screw (2)
- 23S-233 Rear Sight Stop
- 23D-266R Takedown Screw (Front)
- 40-266R Takedown Screw (Rear)

- 40-279 Trigger
- 40-284 Trigger Spring
- 40-286 Trigger Pin
- 40-289 Dummy Screws (2) (Peep Sight)
- 40-292 Ejector Screw
- 40-361 Safety Plunger Spring
- 99-422 Grip Cap
- 99-423 Grip Cap Screw
- 40-503 Bolt Pin
- 40-505 Bolt Sleeve and Handle
- 40-506 Bolt Sleeve Retaining Collar
- 40-522 Recoil Lug Pin
- 45-708NS Bolt Lock Plunger (New Style)
- 40-20710S Bolt Lock Plunger and Spring (Old Style)
- 40-2072NS Magazine Catch Body (New Style)
- 40-2072OS Magazine Catch Body (Old Style)

- 40-2073NS Magazine Catch Screws (New Style)
- 40-2073OS Magazine Catch Screws (Old Style)
- 40-2074NS Magazine Catch Lever (New Style)
- 40-2074OS Magazine Catch Lever (Old Style)
- 40-2075NS Magazine Catch Lever Spring (New Style)
- 40-2075OS Magazine Catch Lever Spring (Old Style)
- 40-2076 Magazine Catch Button
- 40-2077 Magazine Catch Lever Pin
- 40-2503 Magazine Catch Assembly (New Style)

General Specifications

- Type Bolt action repeater.
- Receiver Round, one-piece construction.
- Bolt Two-piece, non-rotating, dual-opposed locking lugs at rear on bolt handle sleeve, bolt handle serves as third locking lug.
- Ignition One-piece striker, coil main spring, cocks on opening and closing of bolt.
- Magazine Single-column, detachable box magazine.
- Trigger Single-stage, non-adjustable.
- Safety Rotary, locks trigger and bolt.
- Extractor Double claw-type extractors, left one serves to hold cartridge against bolt face for proper ejection.
- Ejector Stationary, attached to receiver.
- Bolt-stop Trigger doubles as bolt-stop.



The Model 45 Savage Super Sporter has an excellently shaped, checkered and capped pistol grip.

them and have read almost everything that has been published about them, but that is all. In my hands the rifles felt good, they shouldered well, and I had no problem operating the bolt. They were very well made and finished; though a bit long in the action section, to me the rifles still looked good. Addi-

tionally, they were one of the first big game bolt-action rifles on which a scope could be mounted very low over the receiver without modifying the action in any way.

I have no information as to how many Savage M40 and M45 rifles were made, but judging from the scarcity of them in my part

of the country, the number must not have been large. They could not compete with the high-powered bolt-action hunting rifles that Winchester and Remington were making at the time. In 1936 the Model 40 retailed at \$40 and the Model 45 at \$48.50. Savage discontinued them around 1947.



Savage Model 110 Series

THE SAVAGE ARMS Corp., formerly of Utica, N.Y. produced several centerfire turn-bolt rifles before they introduced the Model 110 Savage early in 1958.

These early rifles were the Model 120; Models 40 and 45; Models 23B, C and D; and Model 340. These rifles are described fully in other chapters.

The Model 110 is not an unusual rifle as far as the entire rifle is concerned, but inside this action are several features never used before in a bolt action, elements which make this action quite different from any other described in this book. Aside from the several new features, the action is still a "Mausertype," having a bolt with forward dual-opposed locking lugs and a staggered-column box magazine.

The Savage 110 action is of novel design and construction and because they were long available as barreled actions to the gunsmithing trade was my incentive to cover it in detail here. Because the 110 barreled action was so reasonably priced, I ordered one shortly after it was introduced rather than a complete rifle.

Around 1962, when Savage announced that they'd make the actions available separately, it was good news for the amateur and professional gunsmith. But what really made this headline news was the offering of two lengths of actions, and that barreled actions, in both lengths, would be available. However, the biggest news was that they would be available in right- or left-hand versions. Nothing like this had ever before been offered at a moderate price. The 1994 Savage catalog still listed several styles and models of barreled actions in various calibers.

Since 1958, Savage has offered various models and styles of sporting rifles based on the original 110 action. These and the changes they have made are too numerous for me to mention here.

Interestingly, the German firm of J.G. Anschütz once made a "Continental" style sporting rifle based on the American-made Savage 110 action. These were once listed in the Waffen-Frankonia catalog (a large

German sporting goods outlet and manufacturer in Wuerzburg) as the Anschütz-Savage repeating rifle. Made for the European sportsman, it has the regular, long, right-hand 110 action, but fitted with a German-styled stock and double-set triggers. The stock has a slightly raised Monte Carlo comb, full pistol grip, and a slim tapered forend ending with a schnabel tip. It has a thick white-line recoil pad, pistol grip cap with a white spacer, and narrow German-type sling swivels screwed into the stock. This rifle was available in the new 5.6x57 and in the older 7x64 calibers.

This undoubtedly means that the barrels were made in Germany and that Anschütz used only the 110 action, substituting their well-made double-set trigger mechanism and trigger guard for the same parts made by Savage.

The Original Model 110 Action

The Savage 110 action was designed by the late Nicholas Brewer, who also designed the Savage 340 action. There were several high-power bolt action rifles on the market then, but all were quite difficult to manufacture and therefore rather high priced. For Savage to achieve success in this field, it was necessary that their rifle be made economically enough to let its sale price be lower than similar rifles already available, and yet design an action equal to, or better than, those of other rifles. It is assumed that Brewer was instructed to design the 110 action so that different action lengths could be made easily; it could be made with a left-hand bolt as well, and be as strong and as safe, or more so, than any bolt action rifle on the market. Brewer did all these things, in the opinion of many firearms experts. In addition, Brewer's action is reliable, easy to operate and easy to disassemble.

The receiver, of chrome-molybdenum steel, probably started out as a piece of seamless tubing. Its front is threaded for the barrel shank, the center milled out to accept the bolt and openings made for the magazine and loading port. The top of the receiver ring and bridge are tapped for scope mount bases, the

side of the bridge tapped for a receiver sight.

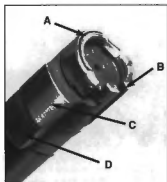
The receiver ring is about 1.6" long. The 110 bridge, about 1.5" long, is longer than in most centerfire turnbolt actions. This extra length gives good support to the bolt when it is drawn back, so there is a minimum of play or wobble at the end of the bolt stroke. The loading/ejection port is slightly over 3.25" long on the medium action, about 3.75" on the long action.

The loading port of most Mauser-type turnbolt actions has the right receiver wall cut down to the bottom of the locking-lug raceway, well below the centerline of the bolt. This leaves little metal along the right side of the receiver, next to the loading port. However, flat-bottom receivers such as the M98 Mauser, the 03 Springfield and the M70 Winchester, have the low-cut right wall reinforced at the bottom by the extra metal which forms the flat bottom and magazine support box. Receivers made from round stock lack this extra metal at the bottom, and certain receivers (like the 721 and 722 Remingtons) have only a very thin right wall, if this area is cut down to the bottom of the lug raceway. On the 110 Savage, however, the wall opposite the high wall is cut down only to the center line of the bolt. This leaves a reinforcing strip of metal along the locking lug raceway, greatly strengthening the action, and makes the receiver more rigid and helps guide the bolt. This extra strip of metal on the low wall is an excellent idea. Incidentally, the low right wall of the Ruger 77 receiver is made the same way.

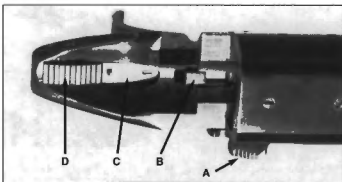
The breech system is unique and good. The 110 barrel has no reinforced shoulder; instead, about 1.5" of the barrel breech is threaded, and screwed onto this is a contoured lock nut. The breech face of the barrel is counterbored for about .250", and into this goes the head of the bolt. The bolt head is also recessed about .135" deep for the cartridge head. The recoil lug, a .150" thick steel stamping is positioned over the barrel shank, between the receiver and barrel

(Above) Savage 110C rifle.

PART II: Commercial Rifles & Actions



Bolt head of the Savage 110 showing: (A) original C-spring extractor, (B) ejector slot, (C) right locking lug, (D) front baffle.



Top view of the rear end of the Savage 110 receiver showing: (A) sear (this part also functions as the bolt-stop and cocking indicator, see text), (B) bolt-lock stud (part of the safety), (C) trigger-adjustment-screw cover, (D) safety button.

lock nut. After the barrel has been chambered and finished it is turned into the receiver. With the bolt in place in the receiver, and a minimum headspace gauge in the chamber, the barrel is turned into the receiver until snug, and then the lock nut is turned tight. This secures the barrel in the receiver and the recoil lug between the receiver and collar. This type of barrel fitting provides an easy and positive way to obtain minimum headspace, and the recessed bolt head and barrel breech completely seal the cartridge in the chamber. The recoil lug is ample to prevent barrel and action set-back in the stock from recoil. The bottom front of the receiver is notched for a projection pressed into one side of the recoil lug; this aligns the lug with the receiver, preventing it from turning when the barrel lock nut is tightened.

The Bolt

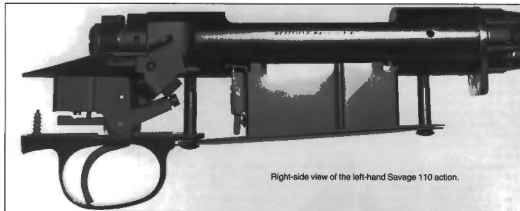
The bolt and striker assembly is made of

many parts. At first glance it all seems very complicated, but the bolt and striker are made this way for easy mass production and assembly.

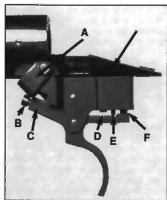
All parts are of steel, many of them investment castings. The bolt body is a tube with the cocking-cam notch recess milled into it. The separate bolt head, with its solid opposed locking lugs, fits into the front end of the bolt body. The C-type spring-clip extractor is fitted over the rim of the bolt head recess on the extreme front end of the bolt head. Lips on the inside ends of the extractor engage grooves cut into each side of the bolt head; these prevent the extractor from being pulled off of the bolt head on extracting a cartridge. When the bolt is closed the extractor is fully within the recess in the barrel face, although there is enough room for the hook end of the extractor to snap over a cartridge rim on closing the bolt. (In 1966 Savage introduced the Model 110C, which has the extractor built

into the front face of the bottom locking lug; it is almost an exact copy of the post-1964 Model 70 Winchester extractor.) The ejector is also a spring-loaded plunger built into the bolt head. The 110C locking lugs extend to the very face of the bolt head, which is recessed for the cartridge head, necessitating that the breech end of the barrel be made flat, not recessed. This extractor/ejector system is better than the earlier C-spring system. The new bolt head's retainer-pin hole is drilled at a 90-degree angle from the old bolt. I have been told by Savage that they now intend to make all 110 actions with this newest locking-lug extractor and ejector.

A clever gas-escape baffle is used on the 110 bolt. A steel piece, shaped much like the locking lugs, is positioned at the rear of the bolt head, between it and the bolt body. A spring-steel friction washer, between this baffle and the bolt body, tensions the baffle. The



Right-side view of the left-hand Savage 110 action.



Savage 110 trigger mechanism showing: (A) sear, (B) sear engagement adjustment screw, (C) sear end of trigger, (D) trigger-stop adjustment screw, (E) trigger spring plunger (directly under the pull weight adjustment screw, as indicated by arrow), (F) safety stop. See text for complete details on how to adjust this trigger.

bolt head and baffle are held in place on the bolt by a retainer pin running through the front of the bolt body. A hole through this pin allows the firing pin to pass; with the firing pin assembled in the bolt this pin cannot be removed. When the bolt is closed and locked, the baffle virtually seals off the locking lug raceways in the receiver ring so that escaping gases cannot rush rearward. A large gas-vent hole in the side of the bolt head, and two holes (one in each side of the receiver ring), one of them opposite the bolt head hole, allow all gases to escape harmlessly. The baffle also prevents dirt from entering the open locking-lug raceway, and also serves as a bolt guide when the bolt is opened. This baffle arrange-

ment can be used because the bolt head is detachable. I see no disadvantage in the detachable bolt head.

The bolt handle is also made as a separate part, its base encircling the rear end of the bolt body. Two projections on the end of the bolt body, fitting matching grooves inside the bolt collar, prevent the bolt handle from turning on the bolt. A solid knurled-headed screw, called the bolt assembly screw, threads into the rear end of the bolt, holding the bolt handle in place and sealing the bolt. Three ball-bearing plungers under the head of this bolt-assembly screw, and notches in the rear of the bolt handle base, keep the screw from loosening once it has been turned tight. The low profile bolt handle will clear the eyepiece of a low-mounted scope. The slightly hollowed grasping ball has a knurled ring around it.

Another baffle is fitted on the rear of a bolt body. It is a steel collar, which partly encircles the bolt body, positioned just forward of the bolt handle base. A ball-bearing plunger holds it in place during the operation of the bolt. It is intended to seal off the two locking-lug raceways at the rear of the receiver, preventing the entrance of foreign material and deflecting any gases that might enter the locking lug raceway. An inclined projection on one end of the baffle, and a matching inclined surface on the bolt handle base, imparts the initial extractor camming power to the bolt as the handle is raised.

The two lugs, engaging behind shoulders inside the heavy receiver ring, securely lock the cartridge inside the chamber. The root of the bolt handle, engaging a deep notch cut into the tang, serves as the third or auxiliary safety lug.

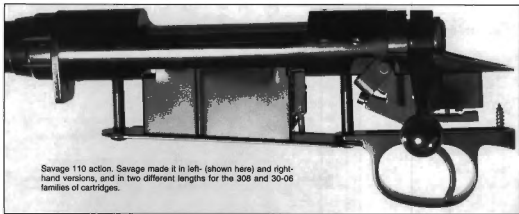
If the bolt is unique, so is the striker assembly. The one-piece firing pin is very light. The threaded front and rear ends of the firing pin body are milled flat for the length of the

threads. The firing pin stop nut is threaded over the front end; in assembling the firing pin in the bolt at the factory the stop nut is rotated until, when it is resting on the rear of the bolt head, the firing-pin tip protrudes .060". The rear end of this nut is notched, and a toothed washer fitting over the flattened firing pin body, and held against the stop nut by the tension of the mainspring, keeps the firing pin from turning and maintains a constant adjustment.

On the rear of the firing pin there is another toothed washer, which cannot turn on the firing pin, and a cocking piece nut which threads on the firing pin; these hold the coil mainspring captive over the firing pin. The firing pin is given forward tension by a thin steel sleeve, called the cocking pin sleeve, held in the rear of the bolt body between the bolt assembly screw and the cocking piece lock washer forward of the cocking piece nut.

This sleeve, notched at front to match the teeth on the washer, is slotted so the cocking piece pin can be inserted into the cocking piece. Once assembled, the cocking piece cannot turn on the firing pin. In assembly, the cocking piece must be adjusted so that the cocking pin clears the bottom of the cocking cam about $1/64"$ when the firing pin is in the fired position. If the cocking pin does not clear the bottom of the cam, it or the cocking piece nut are likely to be damaged when the rifle is fired; if given too much clearance, the rifle might fire before the bolt is fully closed and locked. When the bolt is in the receiver, the large round head of the cocking pin lies and moves within the locking lug raceway opposite the bolt handle.

The 110 trigger assembly, also quite unusual and clever, does not permit entirely satisfactory adjustments. The trigger mechanism, housed in a heavy folded sheet metal box, is attached to the bottom of the receiver tang by a long pin, the same pin which holds the sear in place. The



Savage 110 action. Savage made it in left- (shown here) and right-hand versions, and in two different lengths for the 308 and 30-06 families of cartridges.

PART II: Commercial Rifles & Actions

trigger is pivoted on a pin in the bottom of the trigger housing. A slotted screw, threading into the front end of the trigger, can be adjusted to limit sear engagement. The safety is above the trigger, sliding in the trigger housing and a groove cut into the tang. Three holes are tapped vertically in the safety. The rear hole contains the set-screw which contacts the trigger when the safety is pulled back to the Safe position. It is normally satisfactorily adjusted at the factory, but to readjust it the trigger must be removed first. The center hole contains a plunger, spring and set-screw, which provide tension to both safety and trigger, and limited adjustment for trigger weight-of-pull. The hole, exposed in the safety slot in the tang, is normally closed by a small spring cover, which must be lifted off before an adjustment can be made. The front hole contains two set-screws, one to lock the other; these are supposed to be the trigger stop or over-travel adjustment screws. These screws, usually, are adjustable only from the bottom after removing the trigger, but on some rifles this hole is accessible from the top. A projection on the upper front part of the safety extends into the boltway; when the safety is pulled back or engaged, this projection moves back into a notch in the base of the bolt handle and locks the bolt. For instructions on how to adjust this trigger see the heading "Trigger Adjustment."

In 1966, Savage introduced the Model 110C rifle with a detachable box magazine. A new and improved trigger mechanism was also introduced with the 110C, with more precise adjustments [see the exploded view drawings].

The 110 sear, a marvel of ingenuity, serves a three-fold function: as sear, bolt stop and cocking indicator. It is a folded piece of tool steel positioned around the front of the trigger housing, pivoting on the pin which holds the housing in place. It is tensioned by a wire

spring to keep it forward. One end of this sear, projecting through a slot cut into the bottom of the right locking lug raceway in the bridge, stops the rearward travel of the bolt by contacting the lug on the front baffle; on closing, the bolt holds the cocking pin back to cock the action. The front end of the trigger, contacting the bottom of the U-shaped sear, holds the sear from pivoting when the action is cocked. Pulling the trigger releases the sear from the pressure put on it by the cocking pin, allowing the latter to move forward. An adjustment screw on the front end of the trigger limits the trigger/sear engagement. Turning this screw in (clockwise) reduces the sear engagement. The stock has to be removed to make this adjustment. A serrated thumbpiece or button on the right side of the sear projects over the stock line, along the side of the bridge. After pulling the trigger and depressing this button, the sear is pivoted back so the bolt can be removed from the receiver. Cocking the action raises this button; on firing the rifle the button pivots downward, so it also serves as a cocking indicator which can be seen and felt.

The ejector is a plunger fitted to the rear of the magazine box, its flattened end projecting into the receiver. Tensioned by a small coil spring, it's kept in place by a sheet metal cover held against the magazine box. This cover is called the magazine latch since it also holds the magazine box forward and in place in the receiver. A narrow angled groove is cut into the underside of the bolt head; on opening the bolt, the ejector moves into it to flip the cartridge or cartridge case out, up and to one side. The ejector can be easily removed, which may be convenient for the handloader if he prefers to pick the empty cases from the action.

The non-detachable magazine box is made of a heavy gauge sheet metal. Its top front and rear edges are bent outward; the box is positioned and held in the magazine well opening

by these lips engaging slots cut into the bottom of the receiver. Cartridges are held in the magazine and guided into the chamber by guide lips milled alongside the magazine well openings in the receiver.

The cartridges are held in a staggered position in the magazine box by the stamped steel magazine follower, which has a rib on its left side. The standard type of W-shaped magazine spring is used. Small vertical ridges, pressed into the sides of the magazine just forward of the cartridge shoulder, hold the cartridges from sliding forward as the rifle recoils, preventing bettering of the bullet points. This is a good feature. The magazines in either length action are also made slightly longer than necessary (up to 1/16"), so the handloader can load cartridges to a greater overall length than factory-loaded cartridges. The bottom of the magazine is covered by a rounded steel floorplate.

The barrel and action assembly is held in the stock by two floorplate screws. These pass through holes in the ends of the floorplate, the floorplate insert and stock, threading into the receiver in front and rear of the magazine box. The trigger guard bow, made of a lightweight alloy, is anodized black. The rear floorplate screw goes through a hole in the front end of the trigger guard, while a wood screw holds the rear end in place.

Comments

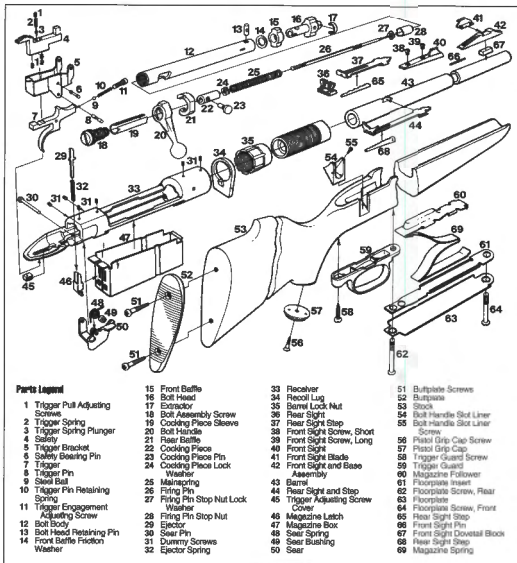
It should be remembered that the 110 action is made in two lengths, and for either a right- or left-handed shooter. Savage describes these action lengths as Short, Long and Magnum, but there are only two different lengths, best described as medium and long. The 110 is not made in a true "short" length, say, as compared with the short Sako action. The medium action handles cartridges of 30-06 head size, whose overall length is less than 2.80". The long 110 action, just .750" longer than the medium length, has a magazine long

Dimensional Action Specifications

Weight	
(Medium-length action) ..	41 oz.
(Long action) ..	43 oz.
Receiver length ..	8.750"
(Long action) ..	9.25"
Receiver ring diameter ..	1.380"
Bolt diameter ..	.068"
Striker travel (approx.) ..	.275"
Bolt travel ..	4.00"
(Long action) ..	4.50"
Bolt face recess:	
Depth ..	.135"
Diameter ..	
(standard caliber) ..	.475"
(magnum caliber) ..	.535"
Magazine length ..	2.85"
(Long action) ..	3.40"
Guard screw spacing ..	4.525"
(Long action) ..	5.025"

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece machine steel. The recoil lug is a separate part. Non-slotted bridge. Tapped for scope mounts and receiver sights.
Bolt	Multi-piece with separate bolt head. Dual-opposed locking lugs on the bolt head, the bolt handle serving as safety lug.
Ignition	One-piece firing pin with detachable cocking piece powered by a coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column four-shot box type for standard calibers; three-shot for magnum.
Trigger	Single-stage type adjustable for pull weight, sear engagement and over-travel.
Safety	Sliding tang type locks trigger and bolt.
Extractor	Rotating spring-clip type on bolt head. (See text for note on new extractor.)
Bolt-stop	The sear acts as the bolt-stop, contacting right lug of the front bolt baffle.
Ejector	Plunger type positioned at rear of magazine box. (See text for note on new ejector.)



enough to accommodate cartridges of 30-06 length. The so-called "Magnum" action, of the same length, handles the short belted magnum cartridges of 30-06 length, such as the 264 Win. Magnum, 7mm Magnum, et al.

These actions are made for right- or left-hand operation. The left-hand action is not a conversion of the right-hand action, but was originally made that way. Both actions are alike except

that some parts, such as the receiver and some bolt parts, are made as mirror images.

No action, of course, will satisfy everyone, and a lot of people found faults with the 110. Some gunsmiths I've talked to like nothing about it. In my opinion it's a sound action and good value for the money, especially for the left-handed shooter. It certainly is one of the safest turnbolt actions to fire, and there is no question that it is also a strong action.

The usual criticisms I heard concern the magazine, floorplate, trigger guard, trigger and barrel lock nut. Most people wanting to build a rifle around this action, or those who want to fit a stock to the barreled action, dislike most the alloy trigger guard and the thin stamped floorplate. Some trigger conscious shooters consider the 110 trigger no good. The 110 trigger mechanism is good and it satisfies the demands of most shooters.

PART II: Commercial Rifles & Actions

As for the barrel lock nut, its use by the factory enables them to keep manufacturing costs down. I dislike the appearance of this sleeve on the barrel of a custom rifle. In fitting a new custom barrel to the 110 action, the lock nut can be discarded, the barrel made with a shoulder and fitted to the receiver in the same way Remington fits barrels to the 721 and 722 actions. This gives a more pleasing line. The use of the collar also limits the size (diameter) of barrel which can be used. If a barrel larger than 1" in diameter at the breech is to be used, as in building a target or varmint rifle, the lock nut cannot be used; the barrel must be fitted as in the Remington 721.

A minor objection is the use of a wood screw to hold the rear end of the guard bow in the stock. Some stockmakers discard this screw, using instead a regular long guard screw, tapping a hole for it in the rear end of the receiver, behind the safety. Incidentally, the other guard screws are .250" in diameter, the thread pitch 28 per inch.

Trigger Adjustments

The nearby photo shows the various parts of the trigger mechanism. As shipped from the factory the trigger pull is usually quite heavy, often at five pounds or more. The location of the trigger weight-of-pull adjustment screw is indicated by the arrow, just forward of the safety button. The thin spring steel cover can be lifted out with a small wire hook or with a penknife. Before doing this, remove the bolt and pull the safety back. Turning the adjustment screw counterclockwise reduces the pull weight. Only limited adjustment is possible, for turning the screw out too far interferes with operation of the safety. After adjustment, replace the spring cover and test the safety. If it is hard to move forward the adjustment screw has been turned out too far.

Even with the screw turned out as far as possible, trigger pull may still be too heavy to suit many shooters. However, the pull can be made lighter and shorter by adjusting the sear engagement screw (B). To do this, the barreled action must be removed from the stock. To further lighten the pull, turn this screw in (clockwise). This is best done with a penknife. The lightest pull obtainable is around 3.5 pounds. After making these adjustments, the action must be tested to make sure the trigger will hold the striker back everytime the bolt is closed. Make the test by closing the bolt very smartly several times; if the striker falls at any time there is not enough sear engagement or the weight-of-pull adjustment is too light.

If screw (B) has been turned in too much the safety stop screw (F) may be too far out to allow the safety to be pulled back. In this case, it is necessary to remove the trigger by driving out the trigger pin, and then turning in the safe-

ty stop screw. After reassembling, test the trigger and safety to make sure the trigger cannot be pulled back when the safety is engaged.

Although a trigger stop adjustment is provided (two setscrews at D), it will be found that the safety stop also functions as the trigger stop. It is possible, however, to adjust the trigger stop screws to halt trigger movement the moment the sear breaks. On some 110s this can be done from the top of the safety after removing the adjustment screw cover, provided two holes are visible. If only one hole is visible, adjustment has to be made underneath, after removing the trigger. In any case, it is hardly worth the bother to make this adjustment since the safety stop screw does the same thing.

Markings

Model 110 serial numbers are stamped on the receiver ring and etched on the bottom of the bolt. The word SAVAGE, and the model designation, e.g., MODEL 110L, are also stamped on the receiver ring. Stamped on the receiver wall is:

—SAVAGE ARMS—
WESTFIELD, MASS. U.S.A.

On 110 rifles and barreled actions the caliber designation is stamped on the barrel, along with the Savage proofmark, the letters SP within an oval.

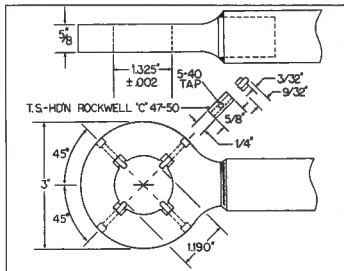
The words PROOF TESTED are also stamped on the barrel, which means that the rifle was proof tested after the barrel was fitted with regular proof loads (blue-pills) which

develop much higher pressures than the commercial loads for any of the cartridges for which this rifle is chambered.

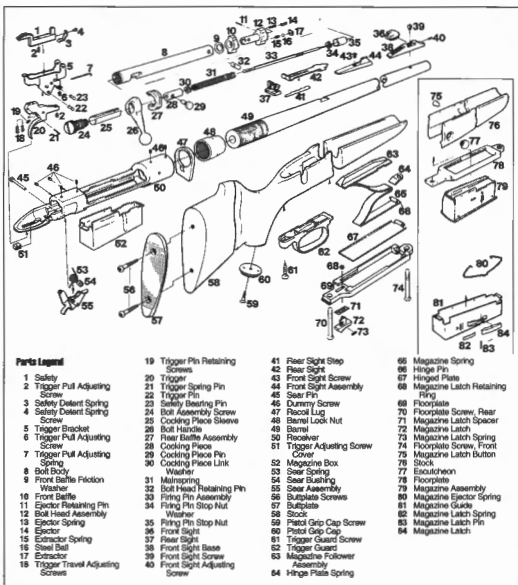
Takedown and Assembly

Check to see that the chamber and magazine are empty. To remove the bolt, raise the bolt handle and pull the bolt back while holding the trigger back and depressing the cocking indicator button. To replace the bolt, the trigger must be held back as the bolt is inserted.

Disassemble the bolt as follows: Using a coin, unscrew the rear bolt assembly screw. The cocking piece sleeve will come out with it, and it need not be removed from this screw, although it can be spread apart with a screw-driver blade and removed. The bolt handle and the rear baffle can be pulled off the bolt's rear end. Pull out the cocking piece pin. The firing pin and mainspring assembly can then be dropped out of the bolt. The cocking piece can now be unscrewed from the firing pin, and the cocking piece lock washer, mainspring and firing pin stop lock washer can be removed from the firing pin. The firing pin stop can also be unscrewed from the front of the firing pin. Unless necessary, the firing pin stop lock washer and the firing pin stop should not be removed. If the firing-pin stop is removed or turned, the stop must be adjusted on reassembly so that the firing pin protrudes about .055" to .060" from the face of the bolt head. Reassemble the other parts in reverse order. In reassembling the cocking piece, it must be adjusted so that when the firing pin is down (in the fired position) the



Specifications for making a barrel lock nut wrench for the Savage 110.



cocking piece pin clears the notch in the cocking cam by $1/16"$. Before the bolt can be inserted into the receiver the firing pin must be cocked. This can be done by pressing the cocking pin against the edge of a workbench and moving it to the cocked position, or by unscrewing the bolt assembly screw and repositioning the cocking piece pin to the

cocked position, then turning the bolt assembly screw back into place.

With the firing pin assembly removed from the bolt, the bolt head assembly can be removed by pushing out the bolt head retainer pin with the firing pin tip. The bolt head can then be pulled off and the front baffle friction washer and baffle removed. The extractor can

be slipped off of the bolt head by lifting up the end opposite the hook until it can be slipped past the bolt head. Reassemble in reverse order. In reassembling the bolt head the ejector slot must be at the bottom.

Remove front and rear floorplate screws, then remove floorplate, floorplate insert, magazine spring and follower from the bottom of

PART II: Commercial Rifles & Actions

the stock, and lift out barrel and action. Remove the trigger guard bow screw and the bow can be removed from the stock. Reassemble in reverse order.

Remove the magazine by pressing its latch (this part also covers the ejector and spring) toward the receiver, tipping it away from the magazine box; it and the ejector can then be removed. Slide the magazine box to the rear, lifting its front end away from the receiver so it can be pulled forward again and removed. Reassemble in reverse order.

Remove the trigger assembly by pushing out the rear pin, from right to left, then pull the front of the trigger housing away from the receiver until its rear end is unlocked, letting the entire assembly be lifted free. In doing this, and if the rest of the trigger mechanism is to be disassembled, carefully note the position of all parts so they can be correctly assembled again.

The barrel lock nut, very tight against the recoil lug and receiver, holds the barrel locked in the receiver. To remove the barrel, a special wrench (see accompanying drawing) is needed to loosen the lock nut, if the nut is not to be damaged. Once the lock nut is loose the barrel is easily removed.

Savage Model 110 Operation

To load: open the bolt and place a cartridge on the follower; with the thumb push it down and to the rear, into the magazine, until it is retained there; insert additional cartridges in the same manner; with the magazine full, a single cartridge can be slipped into the chamber and, while holding the cartridges down into the magazine so the bolt can pass over them, the bolt closed. The rifle is now ready to be fired by pulling the trigger.

Safety operation: to engage the safety, slide it back with the thumb; in this position the trigger and bolt are locked. To fire the rifle

slide the safety forward as far as it will go, when the letter F will show behind the safety button.

Unloading: the chamber and magazine can be unloaded with the safety On. To do this, first slide the safety forward and raise the bolt handle; now slide the safety back to the Safe position; open and fully close the bolt until the last cartridge has been ejected from the magazine. Always keep the muzzle pointed in a safe direction when loading and unloading the rifle.

The Savage Model 110C

In 1966 Savage introduced their Model 110C with the "C" to indicate a clip or a detachable magazine box. This model and the changes made on it from that of the regular M110 will be described a bit further on. Before describing the M110C I would like to review some of the events that took place at the Savage plant between then and 1984. Surprisingly, however, some of the models just mentioned have been reintroduced and the list of models listed in the 1994 Savage catalog numbered well over thirty and this includes the left-hand models.

For example, up to 1984 all Model 110 rifles and their variations, except those listed below, have been dropped.

Model 110C—This is the top of the Savage 110 sporter crop. It has a 24" barrel, Williams Guide open rear sight adjustable for windage and elevation, bead front sight on Williams ramp base, receiver drilled and tapped for scope mounts, detachable box magazine, walnut stock with raised comb and cheekpiece, checkering, and quick-detachable sling swivel studs. Weight is 7.5 pounds; in calibers 22-250, 243, 25-06, 270, 7mm Magnum and 30-06.

Model 110E—This is the economy model of the M110. It has a 24" barrel with Williams

adjustable rear and front sights, tapped receiver, non-detachable magazine, walnut-finished hardwood stock with raised comb. Weight is about 7 pounds; in calibers 243, 308, and 30-06.

Model 110ES—Same as M110E except it is supplied with 4x scope and mounts.

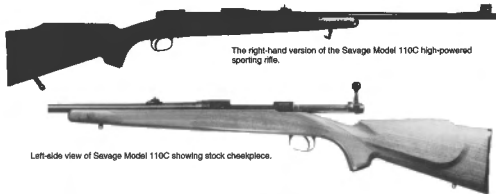
Model 110CL—Same as M110C except it has a left-hand action and is available only in calibers 243, 270, 7mm Magnum and 30-06.

Model 110S—This is Savage's M110 target rifle for the silhouette shooting sport. It has a target-styled stock with fluted comb, Wundhammer swell, stippled grip areas, and a maximum weight of 8 pounds 10 ounces, 22" barrel, in calibers 308 and 7mm-08.

Since the first edition of this book a number of changes have occurred with the Model 110. To begin, several model variations have been dropped, other model variations introduced, as well as changes and improvements made in the existing models of both the standard 110 and 110C. Two new models, the Model 112 Varmint and the Model 111 were introduced and dropped. Both were based on the 110 action, with the action of the Model 111 made as a single shot with solid receiver bottom. The Model 112 was on the market from about 1975 to 1981, and the Model 111 from 1974 to 1981. In addition, there were changes made in both the 110E and the 110C, as well as changes made too frequently to keep track of. Some of the changes were of minor nature and not worth mentioning, while others were real improvements that I will mention. The basic difference between the E and C models is in the magazine, but there are others not readily seen unless one has both rifles to compare.

The M110C Rifle

Originally made in calibers 22-250, 243, 25-06, 270, 7mm Magnum, and 30-06, the



The right-hand version of the Savage Model 110C high-powered sporting rifle.

Left-side view of Savage Model 110C showing stock cheekpiece.



The Savage Model 110C action with magazine detached.

M110C has a 24" tapered sporter barrel fitted with a Williams Guide open rear sight adjustable for windage and elevation, and a bead front sight mounted on a screw-on ramp. The barrel is full floating in the forend and the stock is made of walnut. Gripping areas of the stock have a generous amount of checkering, and it has a raised comb and cheekpiece. Fitted on this stock are an aluminum buttplate, black plastic pistol grip cap and studs for quick-detachable sling swivels. A hard, semi-glossy finish covers the stock. Pushing a button on the right side of the stock unlatches the detachable box magazine, under spring tension, from the action. The action has a three-position safety, and in its center position the

bolt can be operated while the trigger is locked by the safety. Except for the bolt which is bright, all metal parts are blued. Average weight is around 7.5 pounds.

The 110C Action

The receiver is round, 1.355" in diameter and 8.750" long. The recoil plate is secured between the barrel collar and the receiver. The breech end of the barrel is flat.

The 110C bolt is constructed much like the early 110 bolt except for the following: 1) The dual-opposed front locking lugs are even with the front end of the bolt, and it is because of this that the breech end of the barrel is made flat. 2) The extractor is a small flat part that

slides in a mortise cut into the face of the right locking lug. It is provided tension to grip a cartridge head by a spring-backed ball bearing. A spring-backed plunger in a hole at the outer edge of the cartridge head recess in the bolt face serves as the ejector. This entire arrangement—that of the locking lugs being flush with the bolt face, the sliding extractor, recessed bolt face and ejector—is almost identical to the head of the post-64 Model 70 Winchester bolt. 3) A rib on the lower outer edge of the right lug of the bolt baffle slides in a matching groove cut into the right receiver rail, and this arrangement helps guide the bolt and prevents binding as the bolt is operated. 4) A coin-slotted bolt assembly screw is

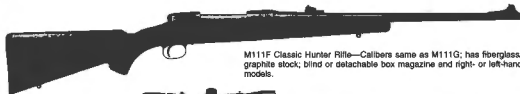


Left side of 110C action with bolt opened.

PART II: Commercial Rifles & Actions



M111G Classic Hunter Rifle—Calibers 223 Rem., 22-250 Rem., 243 Win., 250 Sav., 25-06 Rem., 270 Win., 300 Sav., 30-06 Springfield, 308 Win., 7mm Rem. Mag., 7mm-08 Rem., 300 Win. Mag.; weight 6.75 lbs.; 22" barrel; walnut-stained checkered hardwood stock, recoil pad and blind or detachable box magazine, right- or left-hand models.



M111F Classic Hunter Rifle—Calibers same as M111G; has fiberglass/graphite stock; blind or detachable box magazine and right- or left-hand models.



M111FCXP3 Package Rifle—Calibers 270 Win., 30-06 Springfield, 7mm Rem. Mag. and 300 Win. Mag.; 22" to 24" barrel length; 7.5 lbs.; fiberglass/graphite stock; detachable box magazine; right- or left-hand models, with 3x9x scope, q.d. mounts; leather sling; q.d. swing swivels.



M112BT Competition Target Rifle—Calibers 223 Rem., 308 Win.; weight 10 $\frac{1}{2}$ lbs.; 26" stainless steel heavy barrel; laminated target-styled wood stock; cheekpiece adjustable for height; rubber buttpad; forend accessory rail; black finish on barrel and receiver.

used instead of a knurled-headed one, and the ball bearing plunger and notches in the bolt handle have been omitted. 5) The bolt handle is swept back at a slight angle and the bolt handle knob is no longer hollow or knurled.

The sear, which also functions as the bolt-stop and cocking indicator, is the same as used in the first Model 110, while the trigger and the safety are greatly improved. The problem with the original trigger was that the designers tried to make all the trigger adjustments accessible from the top of the action, just behind the bolt, and this was all but impossible to do. Anyway, it was not a satisfactory arrangement. In the M110C trigger, the adjustment screws are on the housing and in the trigger itself where there is room for them. The trigger take-up and over-travel adjustments are properly made at the factory and need not be touched. However, to adjust the trigger weight of pull it is necessary to remove the stock, but this is no real problem as you need do it only once. Anyway, the adjustments are positive. The safety is also improved in that besides having a Safe and Fire position, it has an intermediate position

in which the trigger is locked but not the bolt, thus allowing the bolt to be operated with the rifle on Safe.

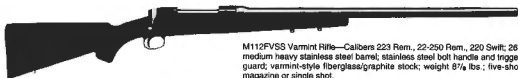
The big difference between the 110C and the 110E is the magazine—the C model has a detachable magazine box. The assembly is composed of these major parts: trigger guard, made of an aluminum alloy and held to the stock by a wood screw; magazine plate, also made of aluminum, with holes in each end for the front and rear guard screws which thread into the receiver to hold the barrel and receiver in the stock. The rear end of this plate also holds the front of the trigger guard bow in place. The magazine guide box is a steel shell fitted between the receiver and the magazine plate. On its right side is a thin latch pivoted on a pin and tensioned by a spring which holds the magazine box in place. A small round button fitted through a hole in the side of the stock allows the latch to be depressed to release the magazine box. A torsion spring attached to the left side of the magazine guide box, which engages with a lip on the magazine, ejects the magazine when the release button is depressed. The magazine box assembly

is composed of a steel shell with curved-in lips to hold a staggered column of cartridges in place, a follower made of aluminum, follower spring, and steel bottom plate.

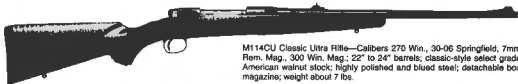
Two magazine lengths are made, one to handle 30-06 length cartridges and the other for 308 length. The box has built-in ridges to hold the cartridges in the rear of the box to prevent damage to bullet points from recoil. When the magazine box is in place in the rifle, its bottom is flush with the stock.

Comments

The Savage Model 110C is a well-made rifle, and well proportioned. It has a well proportioned stock that will fit most adult shooters; not too skimpy for a rifle in the 22-250 caliber for varmint shooting or in 7mm Magnum caliber, and not too bulky for a hunting rifle in the other calibers. It is not a showy rifle and the absence of white lines and the like will appeal to most older shooters. The detachable magazine feature will also appeal to many shooters. The magazine can be loaded through the opened action or removed from the action and loaded. The rifle can be



M112FVSS Varmint Rifle—Calibers 223 Rem., 22-250 Rem., 220 Swift; 26" medium heavy stainless steel barrel; stainless steel bolt handle and trigger guard; varmint-style fiberglass/graphite stock; weight 8 $\frac{3}{4}$ lbs.; five-shot magazine or single shot.



M114CU Classic Ultra Rifle—Calibers 270 Win., 30-06 Springfield, 7mm Rem. Mag., 300 Win. Mag.; 22" to 24" barrels; classic-style select grade American walnut stock; highly polished and blued steel; detachable box magazine; weight about 7 lbs.



M116SE Safari Express Rifle—Calibers 458 Win. Mag., 300 Win. Mag., 338 Win. Mag.; 24" stainless steel barrel; Savage adjustable muzzlebrake; weight 8.5 lbs.; three-leaf adjustable express rear sight; select American walnut stock; fancy checkering; recoil pad and ebony forend tip; four-shot magazine.



M116FSS Standard Weather Warrior Rifle—Calibers 223, 243 Win., 270 Win., 30-06 Springfield, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag.; 22" to 24" stainless steel barrel; weight 6.75 lbs.; fiberglass/graphite stock; right- or left-hand models; five-shot magazine.

quickly unloaded by opening the bolt and removing the magazine. A spare magazine can be carried in your pocket for quick reloading or filled with cartridges of a different load. The only trouble is that detachable magazines do get lost.

Having open sights available on the barrel could come in very handy for the big game hunter. I would suggest that if you think you will ever want to use these sights that you do not go the way of "see-under" or "see-through" mounts. Those mounts place the scope too high for quick and steady aiming. I believe the best mount choice, if you want the use of the open sights, is the Weaver top detachable mount. These mounts place the scope low on the rifle, allow the scope to be quickly removed and replaced without loss of zero, and they are sturdy and reliable.

There is a thing about the 110 design that I like very much, something that I have never heard of or seen mentioned by others. That is the relationship between the trigger and the rear end of the bolt. Look at almost any rifle pictured in this book and you will note that if you draw a vertical line down from the rear of the closed bolt, that the trigger will be well ahead of that line, in some instances by as

much as 1". On the 110, the trigger is directly below the rear end of the bolt. This comes about as the result of the far rearward placement of the bolt handle on the bolt and the absence of a shroud, bolt sleeve or cocking piece. And what this does is to make the upper grip line longer, with the result that I can grip this rifle in the normal shooting position with the second joint of my trigger finger on the trigger. This puts my thumb in perfect position to operate the safety—I neither have to crook my thumb, nor shift my grip. It is perfect: an ideal pistol grip placement, safety placement, bolt handle placement, no crowding and no shifting. This cannot be said about the Browning BBR which also has a sliding tang safety, nor is it true for most other turn-bolt rifles with other safety types and placements.

As I mentioned in my comments on the Model 110 regarding the absence of a guard screw at the rear of the receiver, I feel that this screw is needed even more on the Model 110C, in that this stock has less wood over the sides of the magazine than does the 110E, and that the C stock would be strengthened with this additional guard screw. All it would take is that a small lug be silver brazed to the rear end of the receiver

to provide metal for a hole for the guard screw. I believe it would be a very worthwhile improvement.

As was done with many other rifles described in this book, the Model 110C Savage rifle had a few changes made in it since it was introduced. Perhaps the most noticeable change was that somewhere along the line Savage began to impress checkering into the stock rather than cutting it. The impressed checkering on my rifle was so well done that it was difficult to recognize as impressed checkering. I believe this method of checkering has been dropped on all models, and by the time you read this the checkering will be done with a laser beam. Savage also added a few more calibers to their 110C.

According to the information I have, the M110C made as I have described it here was discontinued in 1988 and replaced by other models with a detachable clip magazine.

The nearby illustrations show a few of the model variations and styles of Savage turn-bolt rifles shown and described in their 1994 catalog. All are built on the basic Model 110 action. In some models there is a choice between a blind magazine and a detachable box magazine and, in addition, some models have no magazine and are single shots.



INTRODUCED in 1947, the Savage-Stevens Model 340 became a popular rifle because it was the lowest priced bolt-action centerfire repeating rifle available in the United States for quite a long time. It started out as the Stevens M325, but soon afterward it was designated as the Savage. It also underwent many changes and improvements and has been sold under many model designations and trade names. The Savage component parts catalog lists this rifle as having been given the following model designations: Stevens Model 322, and Model 325, Springfield Model 840, Savage Model 340, Model 342 and Model 340 Series B, C, D, and V. It was also marked and sold under the Ward's Western Field trade name, one being the Western Field Model 712. At any rate, all were the same basic turnbolt action.

When last made (this model was discontinued in 1985) it was available in calibers 22 Hornet, 222 Rem., 223 Rem. and 30-30. At one time, it was also made in the 225 Winchester caliber. Depending on caliber and style, barrel lengths are 20", 22" and 24", with the barrel being round and tapered. Open sights on the barrel were always standard and for a long time the receiver was drilled and tapped for a scope mount. The Model 340 features a one-piece stock made of walnut, a detachable single-column magazine, side safety that locks the trigger and bolt, and a barrel band that holds the barrel and forend together. Its action is a rather simple one with only one locking lug up front and the root of the bolt handle serving as the other.

The Action

As noted earlier, and as shown in the component parts drawing and list, the Savage-Stevens Model 340 actions are not all alike. Many changes and improvements were made, some due to a model change or when a new caliber was added, or for other reasons. I have no record of when the changes were made and there are too many for me to describe in this book. Most of the changes were made in

connection with the bolt, with some being made with a separate bolt head, different extractors and ejectors, and so forth. Since I cannot cover them all, I will limit my coverage to a late model Savage M340 of the letter series, a rifle in 222 caliber. I found this particular model and caliber to be quite common, and it is for that reason I chose it to describe here.

The receiver appears to have been machined from a piece of seamless steel tubing. The ejection port is machined out on the right side and the magazine well in the bottom. More machining is done on the bridge; at the bottom for the trigger mechanism; and on top it is slotted to allow passage of the forward locking lug. The front end of the receiver is threaded inside to accept the barrel shank. Gas vent holes are provided in the receiver ring, one on each side at the juncture where the barrel and bolt head meet. No vent holes are provided in the bolt. The gas shield closes the entrance of the front locking lug raceway, so that if any gases do escape into that area they will be deflected upward. The cocking piece cap will deflect any gases outward should any get into the bolt through the firing pin hole.

It was in this rifle that Savage-Stevens introduced the unique method of tightening the barrel to the receiver via a lock nut arrangement. The barrel is threaded to a much greater length than the receiver to allow a lock nut to be threaded on it. The barrel is a straight taper from breech end to muzzle—it has no shoulder abutment or reinforced breech section. The lock nut is shaped in a way to give the barrel breech the appearance of a contoured shoulder section. The barrel is faced off flat at the breech, chambered, the lock nut threaded on, the separate recoil lug slipped on the shank, the barrel threaded into the receiver to a point when proper headspace has been obtained, and then the lock nut tightened to hold barrel, receiver and recoil lug securely in that position.

The bolt is made in two parts. The front

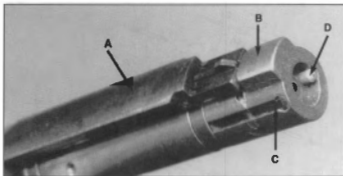
part is called the bolt head and has the locking lug on its front end. The rear part, or the bolt handle, slips partly into the rear of the bolt head. Both are held together with a cross pin. The two parts thus held together become the bolt body, and the base, or root, of the bolt handle becomes the second locking lug. The receiver is machined to form an L-shaped recess inside the receiver ring to accept the front locking lug, and the bridge is notched to accept the bolt handle to form the second locking area. When the bolt is closed and locked the front locking lug is toward the right.

The front of the bolt head is flat and is recessed for the cartridge head or rim. The ejector, a plunger and spring, is fitted in the front of the bolt head at the edge of the recess and they are held in place by a cross pin. The extractor is a simple pivoted hook fitted into a groove in the side of the bolt head and held there on a cross pin. A small coil spring provides the tension to the extractor. A part of the bolt that the factory calls a gas shield, but which might be more properly called a bolt guide, is fastened in place with two bands and pins, thus allowing the part to rotate on the bolt. A wire spring underneath the front end of this part serves to lock the bolt when it is in the open position to prevent it from turning.

The firing mechanism is composed of a one-piece firing pin, coil mainspring and the cocking piece. The cocking piece itself is composed of four parts: cocking cam, cocking cam cap, a pin to hold these two parts together, and a cocking cam key. Then mainspring is compressed between the shoulder on the front of the firing pin and the rear part of the bolt, with the rear end of the firing pin, which is threaded, extending through the center of the rear half of the bolt. The cocking cam is threaded on the rear of the firing pin. A small U-shaped part called a key is fitted in a

(Above) The Savage-Stevens Model 340 rifle.

The M340 bolt showing: (A) gas shield, (B) front locking lug, (C) extractor and (D) ejector.



slot in the cocking cam to prevent the firing pin from turning once the proper tip protrusion has been obtained. In place, this key fits over a squared section on the very end of the firing pin. There is a deep notch machined into the rear of the bolt to serve as the cam to cock the firing pin when the bolt handle is raised.

The trigger mechanism is composed of a folded sheet steel housing, trigger, sear, sear lever and the pins, springs and screws to hold these parts in place and to make them function. Two screws inside the housing fasten the mechanism to the bottom of the receiver. The sear is mounted in the rear of the housing and projects upward into the receiver and into the path of the cocking cam. The trigger is mounted below the sear, and both the trigger and the sear are provided with small torsion springs. Mounted in the front part of the housing is the sear lever which extends rearward to the sear. The sear doubles as the bolt-stop, halting the rearward travel of the bolt when it rises into a notch in the bolt body provided for that purpose. The purpose of the sear lever is to disengage the sear from the bolt by pulling the trigger back as far as it will go. There are no adjustment screws provided to make any adjustments to the trigger pull.

The safety mechanism consists mainly of two parts attached to the right side of the trigger housing, one the outside thumb-operated safety-lever and the other the inside safety-lever that locks the trigger when the safety is engaged. The outside lever also locks the bolt when the action is closed and the safety engaged. A small spring and plunger provide tension to the safety-levers.

The Savage-Stevens M340 magazine box is a light sheet metal affair that is held in place in the action by two L-shaped metal guides or brackets, one at each end of the magazine well opening in the receiver. The front bracket is attached to the receiver by a screw, while the rear one, which is a spring, is attached between the trigger housing and the receiver

by the housing screws. This rear bracket extends below the stock and is pulled back to release the magazine.

The trigger guard is a steel stamping with the front part of it surrounding the opening in the stock for the magazine. It is held in place at the rear by a wood screw, and at the front by the front guard screw that threads into the recoil lug. There is no rear guard screw to hold the rear of the action in place. To assist the single guard screw in holding the stock and the barreled-action together, an inside barrel band is used near the forend tip that holds the forend and the barrel tightly together.

Takedown and Assembly

Make sure the rifle is unloaded. Remove the magazine. (Place the safety in the Fire position.) To remove the bolt, open the action, pull the trigger back as far as it will go and withdraw the bolt.

To disassemble the bolt proceed as follows: Drive out the cross pin near the center of the bolt that holds the two bolt halves together, and separate the two parts. Remove the gas shield rib by driving out the two pins from the shield and rings. Remove the extractor and ejector by driving out the pins that hold these parts in place. To remove the firing pin, follow these steps: Firmly grasp the bolt handle half of the bolt, and with the firing pin tip placed on a hard surface, depress the bolt half to expose the key in the cocking piece and remove the key. Release the pressure and unscrew the firing pin from the cocking piece. The cocking piece cap can be separated from the cocking piece by driving out the cross pin. Reassemble in reverse order. In the reassembly it is very important that the correct firing pin protrusion be obtained. With the cocking piece turned so that it is in the full forward position, the tip of the firing pin should protrude from .050" to .055" from the bolt face. Therefore, in reassembling the firing pin, before the cocking piece key is put into place,

turn the firing pin so that with the front half of the bolt held in place the protrusion is correct. Then insert the key.

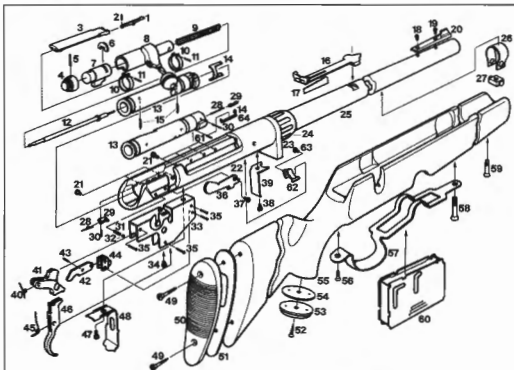
Remove the barrel and receiver from the stock by removing the barrel band and the front trigger guard screws and lift the barrel and receiver from the stock. To remove the trigger mechanism proceed as follows: Drive out the two small pins in the front end of the trigger housing and remove the magazine stop and the sear lever. Drive out the trigger pin and remove the trigger. The two screws that are holding the housing to the receiver are now exposed; turn them out and the housing and the rear magazine catch can be removed. The remainder of the trigger and safety mechanism can then be removed from the housing. Reassemble in reverse order.

The barrel and lock nut are screwed tightly into the receiver and no attempt should be made to remove the barrel unless you have the proper tools and know-how.

Comments

When the Stevens Model 325, which was the forerunner of the present Savage Model 340, was introduced in 1947, it retailed at \$38.25. It was the lowest priced centerfire bolt action repeating rifle available. In the 22 centerfire calibers (22 Hornet, 222 and 223) it makes a suitable rifle for shooting varmints and pests; and in 30-30 caliber it is a good rifle for the deer hunter. There is nothing fancy about the M340, and unless it is your very first centerfire rifle, you won't want to show it to your friends. It is a plain everyday rifle that serves the needs of many hunters quite satisfactorily.

There are many things that I do not like in the design and construction of the M340, but considering its price and the fact that it was designed to be a low-cost rifle, I will have to overlook a lot of these items. I could point out a number of changes that I would want it to have, but if Savage incorporated them, the rifle would have cost much more to manufac-



Parts Legend

- | | |
|-----------------------------|------------------------------------|
| 1 Gas Shield Key | 32 Safety Plunger Ball |
| 2 Gas Shield Key Spring | 33 Trigger Bracket |
| 3 Gas Shield | 34 Trigger Bracket Screw, Short |
| 4 Cooking Piece Cap | 35 Sear Pins |
| 5 Cooking Piece Cap Pin | 36 Safety |
| 6 Cooking Piece Key | 37 Safety Screw |
| 7 Cooking Piece | 38 Magazine Retainer Screw |
| 8 Bolt Body and Handle | 39 Magazine Retainer Spring, Front |
| 9 Mainspring | 40 Sear Spring |
| 10 Gas Shield Clips | 41 Sear |
| 11 Gas Shield Clip Pins | 42 Sear Lever |
| 12 Firing Pin | 43 Sear Cam Pin |
| 13 Bolt Head | 44 Magazine Stop |
| 14 Extractor | 45 Trigger Spring |
| 15 Bolt Head Retaining Pins | 46 Trigger |
| 16 Rear Sight | 47 Trigger Bracket Screw |
| 17 Rear Sight Stop | 48 Magazine Retainer Spring, Rear |
| 18 Front Sight Screw, Short | 49 Buttplate Screws |
| 19 Front Sight Screw, Long | 50 Buttplate |
| 20 Front Sight | 51 Buttplate Spacer |
| 21 Dummy Screws | 52 Pistol Grip Cap Screw |
| 22 Receiver | 53 Pistol Grip Cap |
| 23 Barrel Lug | 54 Pistol Grip Cap Spacer |
| 24 Barrel Lock Nut | 55 Stock |
| 25 Barrel | 56 Trigger Guard Screw, Rear |
| 26 Barrel Band | 57 Trigger Guard |
| 27 Barrel Band Nut | 58 Recoil Lug Screw |
| 28 Ejector Spring | 59 Barrel Band Screw |
| 29 Ejector | 60 Magazine Assembly |
| 30 Ejector Pin | 61 Extractor Spring Pin |
| 31 Safety Spring | 62 Baffle Block |
| | 63 Baffle Block Screw |
| | 64 Extractor Spring |

ture. The overall design is not good enough to make it an outstanding arm, even if these changes were incorporated. Later on, I will suggest some ways by which the amateur gunsmith can make some improvements on it.

I have seen and examined quite a few of these rifles since they first appeared on the market, sold a few of them in my gun shop, and range tested a number of them. Of those I tested, most were in the 22 Hornet and 222 calibers and, right out of the box, sighted with a scope and firing factory ammunition, all had sure 100-yard crow-hitting and 200-yard woodchuck-hitting accuracy. With just a bit of tinkering with the bedding, along with some experimentation to find out the best bedding method of each rifle, perhaps that accuracy could be improved.

I do not much care for the use of a barrel band on a varmint rifle, because it usually affects the accuracy and the zero retention of the rifle. I believe the designers of this rifle should have made the trigger mechanism differently so that the usual rear trigger guard screw could have been used and thus do away with the barrel band. If this had been done the barrel could be made free-floating.

Having just mentioned the trigger mechanism, I would like to add that for such a low cost rifle it is a good one. The trigger pull is a mite on the heavy side and a bit longer than a lot of shooters prefer, but this can be corrected. My main complaint is that the designers made it very difficult to remove the trigger mechanism by hiding the screw heads inside or under other parts. I find no fault with the safety.

As for the bolt, the single forward locking lug combined with the bolt handle seem to be more than adequate in strength to hold the action locked. When this rifle was first announced, chambered for the 225 Winchester cartridge, I was a bit doubtful of the wisdom of this chambering. However, I have never heard of a bolt or receiver failure on this rifle in any of its chamberings.

I am not in favor of a two-piece bolt, but the way the M340 bolt is constructed, and the way the firing pin and its parts are arranged and made, I can't find much wrong with it.

I know that most bolt-action rifle shooters do not like a slotted receiver bridge and side scope mounts, but, unless the entire design of the bolt was changed, the split bridge could

hardly be avoided. At any rate, I have nothing against a good side mount, and I consider the Weaver a good one.

Every part of my late model Savage M340 except the stock and its fittings is made of steel, and the stock is American walnut. Many of the steel parts are stampings, but they are steel just the same. Few of the parts, or the stock for that matter, are well finished. All this makes the M340 a good first center-fire rifle for the beginner amateur gunsmith to practice on. And what can the amateur gunsmith do to improve it? Well, mostly he can improve its appearance, but he can also improve the trigger pull and the action of the bolt and perhaps its accuracy. Some suggestions: Carefully polish all the parts. Reblue most of them and leave others bright or jewel them; rework the sear and trigger for a shorter and lighter pull; inlet the trigger guard; rebed the barrel and action in the stock; experiment with the bedding and don't be hesitant about using a glass bedding compound; refinish the stock, or better still, rework it entirely, trimming it down to remove the original checkering and then refinish and recheck it.

Dimensional Action Specifications

Action length	7.25"
Receiver diameter	1.250"
Bolt diameter	.580"
Bolt travel	3.75"
For 222 (Varies with caliber)	
Striker travel	.350"

General Specifications

Type	Turnbolt repeater, operated by bolt handle.
Receiver	One-piece tubular construction, slotted bridge, separate recoil lug between receiver and barrel.
Bolt	Two-piece construction with single forward locking lug, root of bolt handle serves as second locking lug.
Ignition	One-piece firing pin, coil mainspring, cocks on opening the bolt.
Trigger	Single stage, non-adjustable.
Safety	Pivotal side safety, locks trigger and bolt.
Extractor	Pivotal, mounted in a slot in the bolt head, rotates with bolt.
Ejector	Plunger type in bolt face recess.
Bolt-stop	Sear serves as bolt-stop.
Magazine	Detachable single-column box magazine.



Schultz & Larsen Rifles

RIFLEMAN, SHOOTER, reloader and writer, Philip B. Sharpe was all of them and more. He is probably best known for the two large books he authored and for the cartridge he helped develop. The books, *The Complete Guide to Handloading* and *The Rifle in America*, are classics and the cartridge, the 7x61 Sharpe & Hart is all but obsolete. It was Sharpe's writing and this cartridge that brought the name of Schultz & Larsen to the attention of the American hunter-rifleman, because it was the Danish firm that made the rifles that first chambered it. Therefore, if you want a first-hand account of the history of this cartridge, and the Schultz & Larsen firm, you should read what Sharpe has written about them in these two books. Besides Philip Sharpe, the other two men associated in the development of this rifle/cartridge were Richard F. Hart and Niels Larsen.

In the late 1940s and early '50s, Sharpe began experimental work on a 7mm cartridge of the magnum class that he thought American hunters needed. By then he was a well-known authority on arms and ammunition and had connections with various European arms and ammunition manufacturers. When the cartridge showed promise, Norma became interested in the project and began making and furnishing the special cases Sharpe needed. When the new cartridge showed further progress, the Schultz & Larsen firm became interested and came into the project by designing and manufacturing an entire new rifle for the new cartridge, which by then was given the name 7x61 Sharpe & Hart. Hart had little to do with its development, although he was a strong backer. Thus, the cartridge came first, initially as a wildcard, and then as a commercial number when Norma began loading it. After this came the commercial rifle chambered for it and a firm, Sharpe & Hart Associates, Inc., to market both the ammunition and rifle in the United States

and Canada. This took place in 1954-55.

Philip B. Sharpe died in 1961, still in his prime. It seems from that point on the 7x61 S&H cartridge went into a decline, and with it the Schultz & Larsen sporting rifle. While this cartridge was a good one it did not live up to the ballistics claimed for it. It was no better than any number of 7mm magnum wildcat cartridges worked out by others of much less renown. When Remington introduced their 7mm Magnum in 1962, it was the beginning of the end for all the wildcats similar to it, and for the 7x61 S&H as well.

Schultz & Larsen Rifles

According to Phil Sharpe's book, *Rifles in America*, Schultz & Larsen made their first rifles at about the turn of this century, and what they made were target rifles. By the 1950s—before they made a centerfire bolt-action rifle—they had established an enviable record of making the most accurate target rifles that money could buy. These were mostly bolt-action 22 rimfires stocked and sighted for international freestyle match shooting. I once saw a Schultz & Larsen sporting rifle built on a fine falling block action, and this may indicate that they probably used falling block actions before developing a turnbolt. From what I have read and seen of their early rifles, and what I have seen of their modern bolt-action centerfires, the Schultz & Larsen people were master machinists and rifle craftsmen.

The first centerfire turnbolt sporting rifle that Schultz & Larsen made was chambered for the 7x61 S&H cartridge, according to Sharpe. They designed it from the ground up and it was quite unlike most other high-powered turnbolt rifles of that time. They designated it the Model 54J, the "54" to indicate the year 1954, and the "J" for Hunter or Sporting. It was this rifle that Sharpe & Hart Associates began selling in 1955.

It is my understanding that Sharpe & Hart sold the Model 54J only in 7x61 S&H caliber. However, according to Sharpe, the S&L firm also made this model in 244 Remington, 270 Winchester, 30-06 and 6.5x55 calibers. In addition, they also made this rifle as a single shot. This gun, designated the Model 54JSS, had no magazine well opening in the receiver, no magazine opening in the stock, no magazine floorplate and a medium-heavy barrel chambered for the 244, or 7x61 S&H calibers. The S&L firm also used the M54 action on which to build fine free-style target rifles.

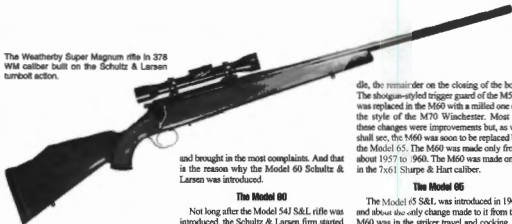
The Model 54J was an extremely well made and finished rifle. In plain evidence of this you need only to glance at one; a fine piece of wood for the stock, expertly shaped, sanded and finished, perfect fit between metal and wood; metal parts highly polished and blued and a precision close-tolerance fit between the metal parts. The bolt opens and closes as easily and as smoothly as the smoothest Krag-Jorgensen.

Features of the Model 54J action are: four locking lugs on the rear of the bolt, short bolt travel, fully enclosed bolt head, safety located on the bolt sleeve to lock the striker, single-stage trigger, single column magazine with hinged floorplate and easy disassembly of the bolt. Sharpe stressed the advantages of the rear position of the locking lugs. He was correct in claiming that this allowed for shorter bolt travel and shorter overall action length, as compared to the usual front locking lug position, and that the rear locking lugs made for a stronger and safer action that is less likely to develop excessive headspace. In the Schultz & Larsen design I can agree with him.

I had the opportunity to sight-in a Model 54J not long after it was introduced, and right

(Above) The Model 54J, Schultz & Larsen's first rifle built for the 7x61 Sharpe & Hart Magnum cartridge. This rifle is fitted with a 4x Leupold scope on Bushier mounts.

The Weatherby Super Magnum rifle in 378 WM caliber built on the Schultz & Larsen turnbolt action.



and brought in the most complaints. And that is the reason why the Model 60 Schultz & Larsen was introduced.

The Model 60

away discovered one thing I did not like—that it was too difficult to load. To begin, the ejection port barely let a loaded cartridge pass through it and, with gloves on, the rifle was not easily loaded as a single shot. Loading the magazine must be done through the bottom, and to do this the rifle has to be turned bottom up, the floorplate opened and the cartridges carefully dropped in one by one. With a scope on the rifle, turning it bottom up is an awkward procedure. I suppose I could have gotten used to it, but as much as I liked the rifle in most other respects, I did not care for the loading arrangement. Then, to top my first shooting experience with this rifle and shooting it with the magazine filled, on the very first shot the floorplate opened up and the cartridges spilled on the ground. The same thing happened when the owner of the rifle fired it. As Sharpe reports in his book, it was the magazine that gave their owners the most trouble

Not long after the Model 54J S&L rifle was introduced, the Schultz & Larsen firm started developing improvements for it, making changes to make it more acceptable for the American big game hunter. First on the list of changes was the magazine—it was changed from a single column to a staggered column arrangement. Doing this made the rifle easier to load, but, in addition, allowed the rifle to be stocked with less of a belly—an improvement in the looks of the rifle. The stock was also made and shaped more to the style preferred by American riflemen, with a fuller forend and comb. Other changes in the action were as follows: The receiver was made a bit longer up front, making the action about $\frac{1}{8}$ " longer; the safety was switched to the right side and made into a three-position affair, with the center position allowing the bolt to be opened with the striker locked. Another change was in the striker travel, which was increased about $\frac{1}{8}$ " over that of the Model 54J, making the travel about .450". Cocking occurred mostly on the upturn of the bolt han-

dle, the remainder on the closing of the bolt. The shotgun-styled trigger guard of the M54J was replaced in the M60 with a milled one on the style of the M70 Winchester. Most of these changes were improvements but, as we shall see, the M60 was soon to be replaced by the Model 65. The M60 was made only from about 1957 to 1960. The M60 was made only in the 7x61 Sharpe & Hart caliber.

The Model 65

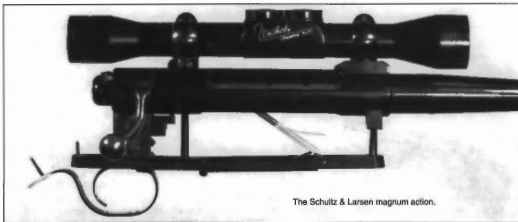
The Model 65 S&L was introduced in 1960 and about the only change made to it from the M60 was in the striker travel and cocking. In the new rifle the striker travel was reduced to about .290", and the cocking of the striker occurred on the upturn of the bolt handle. This was a decisive improvement over the rifle the M65 replaced. The new rifle was also offered in the new 358 Norma Magnum caliber, and probably in 308 Norma Magnum. If anything, the finish and workmanship on this rifle was superior to that of the M54J and M60.

The Model 65 rifle was well accepted by many big game hunters and by most gun experts. For example, the NRA technical staff in their test report of this rifle found little fault with it. As they had done earlier when they tested the M60, they commented very favorably on the action design, the overall construction and finish of the metal and wood parts and the good fit between all parts. Regarding the action, they pointed out the heavy construction of the receiver with a wall thickness of nearly $\frac{1}{16}$ ", which gave the action maximum rigidity and strength. Placing



The S&L magnum action, opened. The four locking lugs which lock the bolt in the receiver are located just forward of the bolt handle.

PART II: Commercial Rifles & Actions



The Schultz & Larsen magnum action.

the four evenly-spaced locking lugs on the rear of the bolt provided extra locking power and reduced the amount of bolt handle lift, as compared to a bolt with only two opposed lugs. Compared to the design of the M98 Mauser, M1903 Springfield, and M70 Winchester turnbolt rifles—in which the inside of the receiver ring is recessed to accept the locking lugs, weakening the receiver ring and thus making it the first part to fail—the thick-walled and unrecessed receiver ring of the Schultz & Larsen action can never fail. Shooters generally had a good word for the stock design of the M65 as well. This included a high comb and a cheekpiece that sloped forward and down to minimize recoil to the face, and a Wunderhammer swell on the right side of the pistol grip.

The Model 65, like its predecessors, is not a lightweight; with a scope mounted the total

weight might run ten pounds. This was generally regarded as being desirable because even in the 7x61 S&H caliber, recoil would be quite severe if the rifle weighed two or three pounds less.

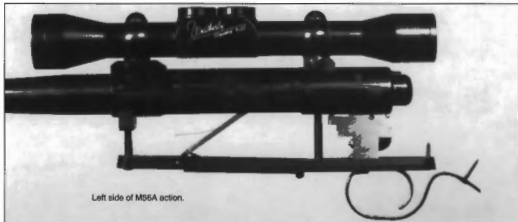
The Model 68DL

In 1967, the M65 was replaced by the Model 68DL Schultz & Larsen. By this time Sharpe & Hart Associates had been dissolved and the California firm of R.C. Fessler & Company became the U.S. distributors for the Schultz & Larsen line. With the change of models and distributors the new Model 68DL became fully Americanized. Not only was a new feature added to the action and the stock dressed up a bit more, but it now came in twenty calibers, many of them being the most popular in the American lineup.

The change in the action consisted of a

redesign of the bolt sleeve and cocking cam. The bolt sleeve was made to enclose the cocking cam—a major safety improvement because with the cocking cam enclosed, no powder gases could escape into the shooter's eyes in the event gases entered into the bolt. In addition, the cocking cam now had a lip that extended rearward under the bolt sleeve, and this served as a cocking indicator that could be seen and felt when the action was cocked. Since the action was now being used for more than just the 7x61 S&H and 358 Norma Magnum cartridges, some changes were made in the magazine and receiver to handle the various lengths and sizes of cartridges.

The most noticeable change that came with the M68DL was in the stock. It was now furnished with a slanted rosewood forend tip and a rosewood pistol grip cap with plastic insert, with both pieces set off by white spacers. The



Left side of M56A action.

recoil pad was also separated from the stock with a white spacer. The stock now looked much like a Weatherby stock.

The M68DL was originally offered in the following calibers: 22-250, 243, 6mm Rem., 264 Win. Magnum, 6.5x55, 270, 7mm Rem. Magnum, 7x61 S&H Magnum, 308, 30-06, 300 Win. Magnum, 308 Norma Magnum, 338 Win. Magnum, 358 Norma Magnum and 458 Win. Magnum. A few other calibers were added later and some of the original ones dropped.

Incidentally, all models of the Schultz & Larsen sporting rifles, which include the M54J, M60, M65 and M68DL, were furnished with factory-fitted recoil pads and all had the receivers drilled and tapped for scope mounts such as the Buehler and Redfield.

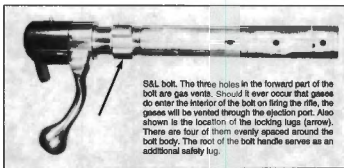
The Super Magnum M56A

When Weatherby introduced their first super magnum cartridge in 1953, the 378 Weatherby Magnum, they had no action big and strong enough to handle it—their very strong Mark V action was still five years in the future. It appears, therefore, that Roy Weatherby, working on the West Coast and Phil Sharpe working out east, arrived at their final development stages on two new cartridges at about the same time. There were turnbolt actions aplenty that Sharpe could chose from to handle his 7x61 S&H cartridge, but I suppose he chose Schultz & Larsen to design and build the action because he was acquainted with Niels Larsen. Just what the circumstances were between Weatherby and Larsen that prompted them to get together, I do not know.

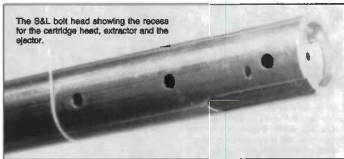
Anyway, Weatherby needed an action and Schultz & Larsen came up with it. As Sharpe tells it, the M54J action was especially designed and built for his cartridge and Schultz & Larsen built it extra strong—larger and much stronger than actually needed. Then, by making it slightly longer, as was done with the M60 action, it was long enough, strong enough, and safe enough to handle Weatherby's Super Magnum. Except for length and magazine changes the two actions are almost alike. The result was that for several years, until Weatherby had his own Mark V action, Weatherby had his rifles in the 378 Magnum caliber built by Schultz & Larsen in Denmark. Because this large action is seldom seen, and since both of these actions are so similar, I have chosen the Super Magnum action to describe in detail.

The Super Magnum Action

The receiver appears to have been machined from a piece of seamless steel tubing or from a solid bar. It is round except for the recoil lug which seems to have been fused to the round receiver ring in some way. The barrel is threaded into the front of the receiver



S&L bolt. The three holes in the forward part of the bolt are gas vents. Should it ever occur that gases do enter the interior of the bolt on firing the rifle, the gases will be vented through the ejection port. Also shown is the location of the locking lugs (arrow). There are four of them evenly spaced around the bolt body. The root of the bolt handle serves as an additional safety lug.



The S&L bolt head showing the recesses for the cartridge head, extractor and the ejector.

and set up very tightly into it. The magazine and the ejection port are machined into the receiver, and these openings are no longer or wider than to permit the entrance and passage of the cartridge the rifle is chambered for. With these openings so made, a lot of metal is left between the receiver bridge and ring, metal that is needed because the locking lugs are on the rear of the bolt.

The bolt appears to be of one-piece construction. The bolt handle, with its hollow pear-shaped grasping knob, is at the extreme rear end of it, and it is low in profile for the lowest scope mounting. A short way forward of the bolt handle are four equally-spaced locking lugs which engage into locking recesses machined inside the rear of the receiver. The root of the bolt handle enters a notch in the receiver when the bolt is closed and locked and thus becomes the safety lug.

Forward of the locking lugs the bolt is a straight smooth cylinder that fits rather closely in the receiver. The face of the bolt is recessed for the cartridge head, and there is a minimum space between it and the breech end of the barrel. The ejector is a spring-backed plunger that is fitted in the bolt head. The extractor, a narrow pivoting piece fitted into a slot in the bolt head, is held in place by a pin and powered by a small coil spring. It is entirely flush with the bolt body.

The bolt-stop is mounted into a recess in the left of the receiver and pivots on a pin. There is a sturdy pin on its front end that projects through the receiver wall into the opening for the bolt. When the bolt is opened, this pin engages in a groove cut lengthwise into the bolt body and ends near the bolt head. Thus, the bolt-stop not only serves to stop the bolt at the end of its travel, but also serves as a guide to prevent the bolt from turning while it is open.

The firing mechanism is comprised of the firing pin, cocking cam and bolt sleeve, with the mainspring compressed between the bolt sleeve and a shoulder on the front of the firing pin. The bolt sleeve is threaded into the rear of the bolt and the cocking piece threaded to the firing pin. A beveled notch in the rear of the bolt cocks the firing mechanism on the upturn of the bolt handle. Firing pin travel is very short and so is the lock time.

The safety is mounted in a vertical hole in the bolt sleeve and engages with the cocking cam when it is in the Safe position. It rotates from front to back; forward it is in the Fire position, and locks the bolt. The safety can also be placed into the halfway position, and this allows the bolt to be opened while the safety is still engaged with the cocking piece.

The trigger mechanism appears to be a



The M54J action with bolt and magazine opened. The magazine can only be loaded through its bottom.

commercially manufactured unit, perhaps a Jaeger. It is built within an alloy housing and contains a sear, trigger springs and adjustment screws. It is held in place in its recess in the bottom of the receiver by a cross pin and a tightening screw. Three adjustments are provided, all located in the front of the housing, and all are horizontal. The two lower ones with lock nuts are factory adjusted for minimum trigger travel (sear engagement and over-travel), while the upper one without the locknut is the weight-of-pull adjustment screw; turning it counter-clockwise reduces the weight of pull. The stock must be removed to gain access to these screws.

The magazine is of the single-column type with a hinged floorplate. It is made of sheet steel and inletted into the bottom of the stock. Two guard screws, one forward and one aft of the magazine (through the magazine plate and threaded into the receiver) hold the barrel and action in the stock. The follower is a flat piece of steel hinged at its front to the shallow magazine box. Two flat springs, one riveted to the floorplate and the other to the follower lift the cartridges into the magazine well in the receiver. The trigger guard is of the thin shotgun type threaded into the magazine plate, and at the rear secured to the stock with a wood screw.

Sharpe mentions in *The Rifle in America* that at one time Schultz & Larsen single shot actions were available for those who wanted to build a benchrest target rifle. I do not know of a better action for this purpose and only wish that this action was still available. Do you remember the time when benchrest shooters had thick sleeves fitted over the receivers of the Model 722 Remington action to make it

stiff and rigid enough for a benchrest rifle? Well, the Schultz & Larsen SS action is built like that to start with, but in a much trimmer package. Having the locking lugs at the rear, along with a thick-walled receiver with only a narrow loading port, makes for an ideal design for a target rifle action.

When the R.C. Fessler firm first started importing the Schultz & Larsen M68 sporting rifle, their advertising folder stated that S&L barreled actions were available on special order from the factory. Whether or not separate S&L actions or barreled actions will ever become available again is open to question and to the best of my knowledge not even the sporting rifle is available in the United States today.

After writing this chapter, I now ask myself some questions: Is the 7x61 Sharpe & Hart cartridge a successful one? Was the entire venture of Sharpe & Hart with this cartridge and with the Schultz & Larsen sporting rifles chambered for it a success? Was the S&L sporter ever accepted on equal terms with such American-made high-powered sporters as the Model 70 Winchester and Remington's Model 721-700? My answer to these questions has to be "No." As for the cartridge, had Sharpe a practical knowledge of gunsmithing, had he put his own ballistic and common sense knowledge into use, and had he not insisted on proving everything over and over again with lengthy tests and come up with a straight-forward cartridge such as one Remington adopted, the story might well be different. As for the Schultz & Larsen rifle, no one made a more precision crafted rifle than the S&L firm. The design of the action is as sound as that of any other action that I can

name. Perhaps its downfall was because it was a different action than American riflemen were accustomed to. All their lives American riflemen have been reading and hearing that a turnbolt action with locking lugs on the front of the bolt is the only design worthwhile, all of which is a fallacy. The American big game hunter also liked his rifle to be a bit lighter in weight than S&L made their rifles. Last, the early passing of Sharpe from the scene surely was a loss to the entire venture, as well as a great loss to all riflemen the world over. His legacy is not in the cartridge that bore his name, but in his many writings and in his two massive gun books.

Markings

The M54J Schultz & Larsen rifle shown here is marked as follows: On the left side of the receiver is the serial number, model designation, maker's name and address as follows:

1886 SCHULTZ & LARSEN M-54J
OTTERUP DENMARK

The caliber 7 x 61 S&H is stamped on the barrel breech. Except for the change in the serial and model numbers, the models 60, 65 and 65DL are marked in about the same manner.

The M56A rifles made for Weatherby are marked in this manner. The name WEATHERBY is boldly stamped on the left side of the receiver. The serial number and model designation are also stamped on the receiver, the serial number on the rifle shown being S149. Below the receiver and covered by the stock is: MADE IN DENMARK. The caliber designation is stamped on the barrel breech as:

WEATHERBY .378 MAGNUM

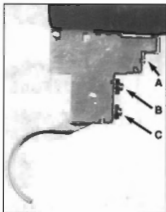
On the right side of the barrel is stamped: **MADE IN DENMARK.**

Comments

There are many features I like about the Schultz & Larsen sporting centerfire rifle described here. First and foremost, I like the fine craftsmanship that went into these rifles. This includes the precise finishing and fitting of all the metal parts. The surfaces of these parts are level and smooth, and a machining tool mark can hardly be found. There are no buffed-off corners or edges and I know how hard it is to avoid them. The fit of wood to metal is also very close and, except for the stock of the M54J, the stocks are well designed for the utmost comfort to the shooter. The stock of the M54J is a bit oddball with its unusual tapered-out pistol grip and sharply tapered forend with schnabel tip. Its worst fault is the placement of the front sling swivel on the forend instead of on the barrel ahead of the forend tip. Even the choice of swivels on this model is unfortunate, being far too light and narrow for such a heavy rifle. However, all the stocks were well made, sanded and finished, and those that were checkered were well executed.

I like many things about the overall design and construction of the Schultz & Larsen action. Made as this action is, with a very thick-walled receiver and a large diameter bolt, there is absolutely nothing wrong with the rear placement of the locking lugs. This placement in no way weakens the receiver ring, which sustains the great amount of stress should the rifle ever be fired with a faulty cartridge. I like the arrangement of the four evenly-spaced locking lugs around the bolt. This results in a very short bolt handle movement to operate the bolt and provides a large amount of clearance between the bolt handle and the scope. This is especially appreciated by a cold-weather hunter wearing gloves or mittens. Some of our best high-powered turn-bolt rifles such as the Remington Model 700 and the Ruger M77 have far too little clearance between the bolt handle and scope.

The rear placement of the locking lugs also provides the shortest bolt travel. The precise



The trigger mechanism of the M56A showing: (A) weight of pull adjustment screw, (B) over-travel adjustment screw and, (C) engagement adjustment screw.

fit of the bolt in the receiver of the S&L action makes for smooth operation and minimum wobble when the bolt is open. This close and smooth fit also prevents possible binding. Even the fine pre-'64 Winchester can be faulted on this point. The extractor and ejector are good, and so is the trigger mechanism. The bolt-stop seems to be adequate, although I would like to have a heavier stop pin used.

There are some things I do not like about the S&L rifle. Except for the Model 56A Super Magnum, all the other models are too heavy and bulky. It cannot be denied that these rifles would be much more unpleasant to shoot were they made one to two pounds lighter, but the average big game hunter prefers a lighter rifle even if it does recoil more. The Model 54J that I fired was pleasant to shoot, but it is too bulky to carry with ease and too heavy to carry for hours on end. As for the M56A, it is none too heavy for the cartridge it fires.

As mentioned before, and as it can be seen in the dimension chart, the M56A action, that is, its receiver and bolt, is no larger or heavier than any of the others. I can only conclude

that if this action is strong and safe enough to handle the 378 Weatherby Magnum cartridge, then the actions of the other S&L models are heavier and stronger than they need be.

It is true that the 7x61 S&H cartridge as loaded by Norma developed extremely high breech pressures, and thus required an extraordinarily strong and safe action, but need it have been made as heavy as it was? Little was done to keep its weight down. The action could have been made shorter, slimmer and cuts made in the receiver and bolt to take off ounces safely. I believe this action would have been immensely more popular had it been smaller and lighter. Certainly any action that is large and strong enough to handle the 378 Weatherby Magnum cartridge is just too immense for cartridges such as the 22-250, 243 and the like. Made as a single shot with no magazine well, this action would be a very good one for building a benchrest target rifle. The fact is that for a few years shortly before and after 1960, separate S&L actions with solid bottom receivers were available for this purpose, and a better ready-made benchrest action would be hard to find. However, I would much prefer to have had a regular M65 or M68 magazine action scaled down to 22-250 size instead.

To cover the very deep single column magazine that Schultz & Larsen used for their Models 54J and 56A, a lot of stock wood was needed. This caused the stocks to have large bellies that could not be hidden by the best of gunstock designers. Later on, when S&L switched to the shallower staggered column magazine, the bulging belly disappeared and the remainder of the stock was shaped more or less in the style preferred by many American riflemen. Even so, these stocks contained a lot of wood to: (1) cover a large action, (2) match the large recoil pad used, (3) form a high Monte Carlo comb and cheekpiece, and for a handy forend, and (4) for a Wundhammer swell and flared pistol grip. What it all amounted to was a heavy and rather bulky he-man's stock. All in all, it was a stock that gave the shooter maximum comfort from recoil, but who cared about this in the hunting field when a pound lighter stock would have served as well and made the rifle more comfortable to carry on a day's hunt?

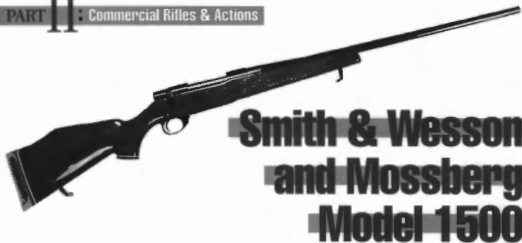
In another chapter I describe the Golden Eagle rifle, and I made a similar statement: The rifle is on the massive side for many of the cartridges it is chambered for. It so happens that the Golden Eagle rifle is more or less a close copy of the M68DL Schultz & Larsen.

To the best of my knowledge, no Schultz & Larsen rifles have been imported into the U.S. since the mid-1980s, and perhaps even well before that. The company ceased operation in 1994.

Dimensional Action Specifications

(Below are listed a few of the specifications of two Schultz & Larsen actions.)

MODEL 54J		MODEL 56A SUPER MAGNUM	
Action length	8.120"	Action length	8.375"
Receiver diameter	1.330"	Receiver diameter	1.325"
Receiver wall thickness	.290"	Receiver wall thickness	.290"
Bolt diameter	.750"	Bolt diameter	.745"
Bolt travel	3.875"	Bolt travel	4.260"
Depth of bolt face recess	.118"	Depth of bolt face recess	.115"
		Bolt face recess diameter	.500"



THE SMITH & WESSON firm has long been known for their extensive line of quality handguns. In 1968 they began marketing a quality high-power, bolt-action rifle bearing the famous S&W trademark emblem. It was not a rifle of their own design or manufacture, but was made for them by the HVA Husqvarna firm in Sweden. In fact, its action was a spitting image of the one that Husqvarna was using on their rifles, but with the H.V.A. seal in place of the S&W emblem. This action is described in detail elsewhere in this book. Smith & Wesson marketed this rifle only from about 1970 to 1973, and then dropped it for reasons unknown to me.

A bit more background history is in order. The Howa firm in Japan began producing their first high-powered turnbolt sporting rifle in 1967. The rifle was the Dickson-Howa Golden Bear. It is not covered in this book, but there was little about this action that was original. Much of it seemed to have been copied directly from the Sako Finbear action, including the integral, tapered, dovetail scope bases on the receiver, bolt-stop and ejector, bolt guide rib, etc. Anyway, it was more Sako than anything else. Then, around 1970, Weatherby introduced their economy rifle, the Vanguard, manufactured by Howa. Later on, about 1979, Smith & Wesson introduced their Howa-made rifle which they designated the Model 1500. Despite what has been previously written about the Howa-made Smith & Wesson turnbolt, it has no distinct Sako features and is quite unlike the Golden Bear, but very similar to the Vanguard. As is stamped on the receiver, the Model 1500 S&W action was "Made to S&W specs."

The Rifle

There were two models of the M1500 S&W rifle, the Standard and the Deluxe, and there is not much difference between

the two. The Standard model has a plain stock fitted with only a plastic buttplate and quick-detachable sling swivel studs. It has no raised comb or cheekpiece and no pistol grip cap. The Deluxe model has a stock made of better quality wood, a raised comb and cheekpiece, white line recoil pad, white line pistol grip cap, and sling swivels. Both stocks are checkered with a panel on each side of the pistol grip and flat-bottomed forend, and both sport a high-gloss finish. The only other noticeable difference is that the Standard model is fitted with open sights while the Deluxe model has none. Both rifles have the receiver drilled and tapped for scope mounts; two holes each in the receiver ring and bridge. Both rifles are also drilled and tapped on the left side for a receiver sight.

The Model 1500 was made in four popular calibers: 243, 270, 30-06 and 7mm Magnum. The rifles are fitted with a lightweight sporter barrel 24" long having a muzzle diameter of .600". The hinged floorplate magazine has a capacity of five rounds for the standard caliber and four for the 7mm Magnum. All the metal parts are polished and blued, except the bolt and the follower which are bright.

The Action

The receiver is of one-piece construction, probably starting as an investment casting and then machined and finished to its final state. It has a flat bottom and a heavy integral recoil lug under the receiver ring. It is not too unlike the pre-'64 Model 70 Winchester receiver with plenty of metal left in the right rail for rigidity. The receiver ends at the rear with a rather long bridge and a short, rounded tang. Holes are provided in the receiver for scope mount bases and a receiver sight, six in all, of the standard 6x48 screw size, and are filled with plug screws. The face of the barrel is recessed for the head

of the bolt and it is threaded tightly into the receiver. There is a gas vent hole in the left side of the receiver positioned at the edge of the barrel face.

The bolt appears to be of one-piece construction with dual opposed locking lugs at its forward end. Both lugs are solid and are set back from the face of the bolt to permit the part of the bolt forward of them to fit the recess provided in the barrel face. The cartridge head is completely surrounded by a ring of steel. A groove in the right locking lug and a matching groove and tongue along the receiver rail serves as a bolt guide and anti-bind feature, not unlike the anti-bind feature that Savage uses in their Model 110C. The bolt handle is at the extreme rear of the bolt where there is a ring of steel to support it, and to provide a wide surface of metal for the cocking cam. This ring partly blocks off the end of the left locking lug raceway. The bolt sleeve is of small diameter and size and it has no shields or flange to deflect powder gases.

Cartridges and cartridge cases are extracted by a pivoting hook extractor fitted in a recess in the bolt head. It is held in place by a cross pin and tensioned by a small coil spring. The ejector is of the plunger type fitted into the bolt face recess.

Evenly spaced along the body of the bolt are three vents directed into the magazine, enough venting to take care of any gases that might enter the bolt from a pierced primer. The root of the bolt handle serves as the third or safety locking lug by engaging into a notch in the receiver. It is of adequate length for easy grasping and has a low profile to clear the eyepiece of the lowest mounted scope. Means are provided in the

(Above) Smith & Wesson's Model 1500 Deluxe bolt-action rifle.



The Mossberg Model 1500.

Author's Model 1500 Dauxe rifle fitted with a Weaver K6 scope in Redfield Sr. mounts.

The Smith & Wesson Model 1500 Mountaineer, introduced in 1983 but since discontinued.

locking lug recesses to cam the bolt forward on the lowering of the bolt handle, and initial extraction camming power on raising the bolt handle to remove a tight case.

The firing mechanism is simple. It consists of five parts: striker (firing pin), cocking head (cocking cam), cocking head pin, mainspring and bolt sleeve. A single lug on the forward end of the bolt sleeve, engaging in a circular recess inside the bolt, holds the bolt sleeve and the rest of the mechanism in the bolt and allows it to turn in the bolt. A cam on the cocking head, engaging in the cocking cam notch on the bolt, cocks the action on the upswing of the bolt handle. The bolt sleeve is not capped or closed at its rear as are most modern high-powered tubbolt rifles, but few other rifles have the venting provisions that the M1500 does.

Resembling the bolt-stop of the Model 70 Winchester, the M1500 bolt-stop is located on the left rear of the receiver with its forward end projecting into the left locking lug raceway to halt the bolt travel when the lug contacts it. It is mounted on a pin, spring tensioned with a small serrated thumbpiece projecting over the edge of the stock. It is a good arrangement.

The trigger guard/magazine box is a one-piece unit made of aluminum alloy finished

with a coat of black epoxy. Guard screws at each end are threaded into the receiver, and in this conventional way the barrel and action unit is held in the stock. The magazine floorplate is made of steel and it is hinged at the front to the trigger guard unit. A latch mounted in the front of the trigger guard bow allows the floorplate to be opened and locked closed. The magazine follower is a stainless steel stamping and is provided upward tension to feed cartridges into the action by a W-shaped follower spring. There are no cartridge guide ridges inside the magazine box to prevent cartridges from sliding forward from the recoil of the rifle.

The adjustable single-stage trigger mechanism is built into an aluminum alloy housing and the assembly is attached to the underside of the receiver by a screw. The safety is combined with it. The main parts inside the housing are the sear and the trigger, both pivoted on pins and both provided with small coil springs. Behind the trigger and threaded through the rear wall of the housing, is the sear engagement adjustment screw and its locknut. Turning this screw clockwise reduces the trigger travel and sear engagement. A similar screw and locknut in front of the trigger is the weight-of-pull adjustment screw, and turning it counterclockwise reduces the weight of pull. Both of these adjustments are properly made at the factory at an optimal safe level, and their heads covered with a plastic material to discourage tampering. However, to make any adjustment the barreled action must be removed from the stock. There is no adjustment provided for

trigger over-travel, as none is needed since this is more or less a built-in feature.

The safety is mounted on the right side of the trigger housing and pivots on a pin. It is provided with a sizable serrated thumbpiece which projects over the edge of the stock. Moving the safety to the rear locks the trigger; pushing it forward allows the rifle to be fired. It is not entirely noiseless and it does not lock the bolt. Cartridges can be fed in and out of the chamber with the safety engaged.

Takedown and Assembly

First make sure the chamber and the magazine are empty. Remove the bolt by opening it, then press down the bolt-stop on the left side of the receiver and withdraw the bolt.

To disassemble the bolt, firmly grasp the bolt body in one hand, the bolt sleeve in the other, turn the bolt sleeve clockwise until it snaps out and withdraw the firing pin assembly. To reassemble, insert the firing pin assembly into the bolt with the cocking cam bar on the striker head, nearly opposite the shallow full-lock notch, and then depress the bolt sleeve against the bolt and turn it counterclockwise until the cocking striker head rests in the full-lock notch.

To disassemble the firing pin assembly, I have this advice. A cross pin through the cocking head fastens it to the firing pin—removing this pin is difficult since you will need to rig up a jig to hold the cocking head partly out of the bolt sleeve in order to remove and replace this pin. So, unless the firing pin or mainspring has to be replaced, don't attempt to disassemble these parts. If it is necessary to remove the extractor and ejector, merely drive out their small retainer pins.



The M1500 action.

Reassemble in reverse order.

To remove the stock, open the magazine floorplate fully and then turn out the rear and front guard screws in that order. This done, the barreled action and the magazine assembly are easily lifted from the stock. Reassemble in reverse order.

The trigger guard/magazine assembly can be disassembled by driving out the pins that hold the floorplate and latch in place, sliding the follower off of its spring and the spring off of the floorplate.

To remove the trigger assembly, turn out the Phillips-head screw from beneath it; but, unless you are skilled in this work you should not attempt to disassemble the trigger mechanism. And, unless you have the special tools and the know-how, you should not try to remove the barrel from the receiver.

Markings

The Smith & Wesson Deluxe rifle that I purchased is marked as follows: Stamped in bold letters on the left side of the receiver is:

SMITH & WESSON

Below it in much smaller letters is:

SPRINGFIELD, MASS. MADE IN
JAPAN TO
S&W SPECS.

The model designation, Model 1500, is stamped on the left side of the receiver ring and the serial number preceded with the letters PN on the right side.

The caliber designation is stamped on the left side of the barrel breech.

The Smith & Wesson trademark, the letters

S and W intertwined, also appears on the recoil pad and in the center of the grip cap. In this last instance the letters are silver on a blue background.

Comments

I like this rifle and Smith & Wesson can be proud to have their name on it. It makes no difference to me that this rifle was made in Japan, although I would much rather read on it, *MADE IN U.S.A.*

There is nothing unusual or outstanding about this rifle. There is probably no feature that is patentable, every feature has been used on some other rifle at one time or another. There is nothing new about the receiver or magazine. For the most part, the bolt is old stuff; dual forward locking lugs, extractor, ejector and all. Not even the bolt guide feature is new, although it is somewhat different from that found on any other modern rifle. The recessed breech face is old stuff. There is also nothing much different about the trigger mechanism.

I like the safety very much. It can be moved with the numb of fingers and the total movement is such that you can feel and see it move unerringly. That this rifle has no bolt lock may bother some hunters who want to carry the rifle loaded using the sling. I do not mind that the bolt sleeve is open at the rear, for in the many thousands of shots I have fired in other rifles with similar open-ended bolt sleeves, I have yet to experience powder gases escaping at that point.

That the M1500 has a longer striker travel



The M1500 action, open.

than most modern turnbolt rifles does not bother me either. In fact, I like it, and the sound the striker makes as it falls assures me that ignition will be positive. The end of the cocking head is a natural cocking indicator, and there is no need to contrive this feature in some other way. Overall, the action is well made and finished. It is sound in design and construction, and smooth in operation.

In general this stock is every bit as good as many stocks on more expensive rifles. It is somewhat less bulky than many of them and I like this. I would like it better if the comb was a bit thinner to remove all signs of attempting to flute it. The underside of the butt needs thinning also, and the cheekpiece ought to be undercut more. The stock on my rifle is sanded very smooth, but not very level and this detracts from its overall appearance. Inside the stock the recoil shoulder is epoxy bedded and this is good. The forend channel is inletted so that only about .750" of the forend tip contacts the barrel to exert some upward tension against the barrel. It would require less than two boxes of ammunition to test this rifle to determine whether this bedding method, or a full-fluted barrel, gives the best accuracy, and if the full-fluted barrel shows the best results, it is an easy matter to sand out the contact area in the tip.

Two Additional Models

Two late comers in the Smith & Wesson line were the Model 1500 Mountaineer and the Model 1700LS Classic Hunter. Both models were made by Howa in Japan on



Left side of the Model 1500 action. Note the bolt-stop (arrow).

essentially the same actions as described earlier.

The M1500 Mountaineer was a budget-priced rifle designed for the hunter who wants to use the rifle with a scope. It is furnished without sights and the stock is made of a walnut-stained hardwood given a dull finish. There is no raised comb or cheekpiece, but there is cut checkering and sling swivel studs. It was made in five popular calibers: 223 and 243 on the short action, and in 270, 30-06 and 7mm Magnum on the long action. The barrel is 24" long for the 7mm Magnum and 22" for the other calibers. The actions have a hinged floorplate magazine and the barrels are rifled by the hammer-forging process. Weight runs from 7 pounds, 6 ounces to 7 pounds, 10 ounces.

The M1700 Classic Hunter is also a light-

weight hunting rifle weighing around 7 pounds, 8 ounces. It was made in 243-caliber on the short action and in 270 and 30-06 on the long action. The 22" barrel is hammer-forged and the stock is made of American walnut. The stock has no raised comb or cheekpiece, but it does have a rubber butt pad, pistol grip cap, schnabel forend, cut checkering, glossy finish and sling swivels.

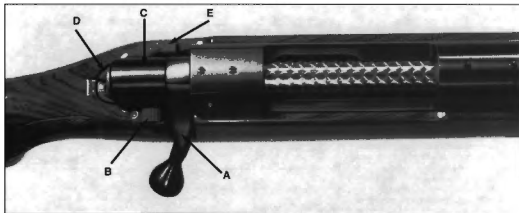
The action of the M1700 differs from the other S&W M1500 rifles in that it has a detachable, double-column magazine of five-shot capacity. With the introduction of these two new models, Smith & Wesson followed the trend toward lighter and shorter barreled rifles, with less wood in the stock.

In 1984 Smith & Wesson got out of the rifle business and the M1500 and M1700 were discontinued.



The M1500 trigger and safety mechanism. Arrows point to the adjustment screws; the one in front is the weight-of-pull adjustment—turning it counter-clockwise reduces the weight of pull. The rear screw controls the amount of sear engagement—turning it clockwise reduces the engagement and trigger travel. Both of these adjustment screws are properly set by the factory, and for normal and safe use by the average shooter neither one should be tampered with.

PART II: Commercial Rifles & Actions



Top view of the action showing: (A) bolt handle in receiver notch, (B) safety, (C) bolt sleeve, (D) cocking piece and (E) bolt-stop.

Mossberg M1500

Shortly after Smith & Wesson ceased the importation of their Model 1500 rifle, O.F. Mossberg became the U.S. outlet for that rifle. According to the scant information I have, this was in about 1986 and it lasted for only a short time before this firm, too, dropped it. The Mossberg M1500 shown here bears the serial number of M-009281 and the markings as follows:

On the left side of the receiver in two lines:

MOSSBERG
NORTH HAVEN, CT.

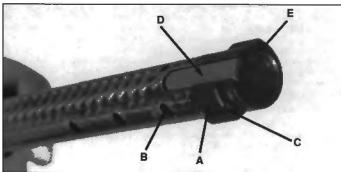
On left side of receiver ring:

MODEL 1500

On the right side of receiver ring is the serial number.

On right side of barrel breech in two lines:

MADE BY HOWA
IN JAPAN



The M1500 bolt head showing: (A) right locking lug, (B) gas vent hole, (C) bolt guide groove, (D) extractor, and (E) ejector.

On the left side of the barrel breech the caliber is stamped.

The following is stamped on top of the barrel in one line:

WARNING: BEFORE USE, READ
OWNER'S GUIDE FOR SAFE OPERA-
TIONS—FREE FROM P.O. BOX 497,
NORTH HAVEN, CT. 06473

The last three digits of the serial number are also marked under the bolt handle.

In all respects the action is identical to the S&W M1500. Shortly after Mossberg dropped this rifle the Westby people took over and called it the Vanguard.

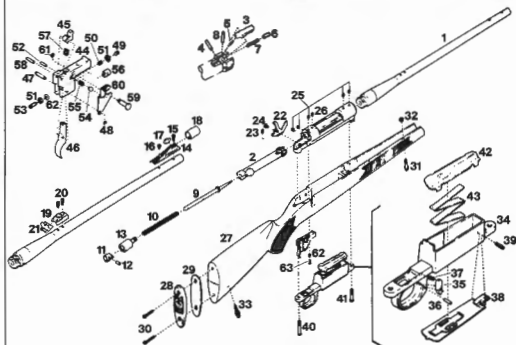
Smith & Wesson M1500

Dimensional Action Specifications

Receiver ring diameter	1.343"
Receiver length	8.425"
Bolt diameter	.681"
Bolt travel	4.685"
Striker travel	.445"

General Specifications

Type	.....	Tumbolt repeater operated by bolt handle.
Receiver	.....	One-piece steel construction with integral recoil lug. Drilled and tapped for receiver sight and scope mount bases.
Bolt	.....	One-piece construction, front dual opposed, solid lugs, root of low profile bolt handle serves as third locking lug.
Ignition	.....	One-piece striker, coil mainspring, cock on uplift of bolt handle.
Extractor	.....	Pivoting claw-type extractor.
Ejector	.....	Spring-backed plunger in bolt face recess.
Trigger	.....	Adjustable single-stage trigger.
Safety	.....	Pivoting side safety which locks trigger.
Bolt-stop	.....	Independent pivoting bolt-stop.
Magazine	.....	Staggered-column box magazine with hinged floorplate.



Parts Legend

- 1 Barrel
- 2 Bolt Body
- 3 Extractor
- 4 Extractor Pin
- 5 Extractor Spring
- 6 Ejector
- 7 Ejector Spring
- 8 Ejector Pin
- 9 Firing Pin
- 10 Magazine
- 11 Cocking Piece
- 12 Firing Pin Retaining Pin
- 13 Bolt Sleeve
- 14 Front Sight Ramp
- 15 Front Sight Screw, Large
- 16 Front Sight Screw, Small
- 17 Front Sight
- 18 Front Sight Hood
- 19 Rear Sight Base
- 20 Rear Sight Base Screws
- 21 Rear Sight Blade
- 22 Bolt-stop
- 23 Bolt-stop Spring
- 24 Bolt-stop Screw
- 25 Receiver Plug Screws, Long
- 26 Receiver Plug Screw, Short
- 27 Stock
- 28 Buttplate
- 29 Buttplate White Spacer
- 30 Buttplate Screws
- 31 Front Swivel Screw

- 32 Front Swivel Nut
- 33 Rear Swivel Screw
- 34 Trigger Guard
- 35 Floorplate Catch
- 36 Floorplate Catch Pin
- 37 Floorplate Catch Spring
- 38 Floorplate
- 39 Floorplate Pin
- 40 Rear Guard Screw
- 41 Front Guard Screw
- 42 Magazine Follower
- 43 Magazine Spring
- 44 Trigger Housing
- 45 Sear
- 46 Trigger
- 47 Trigger Pin
- 48 Retaining Ring Trigger Pin
- 49 Trigger Adjusting Screw, Front
- 50 Trigger Spring
- 51 Lock Nuts
- 52 Sear Pin
- 53 Trigger Adjusting Screw, Rear
- 54 Safety Plunger
- 55 Safety Plunger Spring
- 56 Block
- 57 Sear Spring
- 58 Sear Stop Pin
- 59 Safety Guide Pin
- 60 Safety
- 61 Retaining Ring and Safety Guide Pin
- 62 Washers
- 63 Trigger Housing Screw



Sportco Model 44 Target Rifle

THERE ARE a lot of riflemen in Australia. Game and varmints have always been plentiful and rifleman-hunters abound because of this. There are immense open spaces to shoot. Australia has several military and commercial rifle ranges and they are being used by target shooters. There are arms and ammunition manufacturers scattered around this island continent to supply the needs for all the rifle shooting that is being done there. There is a national rifle association there, many rifle and shooting clubs, many handloaders and a lot of amateur and professional gunsmiths.

In past years many 303 British Lee-Enfield military rifles have been made there, and a lot of American riflemen are familiar with the 310 Martini-Cadet rifle, which, although made in England, came here from Australia. According to the book, *Inside Australia* by the late John Gunther, Australians are avid readers. I have found this to be particularly true among gun owners and users, as gun books sell well there.

Australia's principal high-powered rifle has long been the 303 Lee-Enfield. It was foremost a military arm, but the Australians early on adopted it for sporting purposes, both hunting and target shooting. Many of the military rifles were converted for these uses and they served their owners well. The Enfield probably served the hunter better than the target shooter, because as a target rifle—no matter how much it was modified or changed—it left a lot to be desired. Then along came NATO and their adoption of the 7.62mm NATO cartridge. It was clear to almost everyone that the old 303 British cartridge was on a fast downhill skid. British, Canadian and Australian target shooters quickly adopted the 7.62mm cartridge, going so far as to convert many No. 4 Lee-Enfield rifles to handle it. For the long range, slow-fire, prone competition, the shooters in Australia wanted something better, and they got it in the late 1960s when Omak Australia Ltd. introduced an all-new target rifle which they called the Sportco Model 44. It's a bolt-

action single shot rifle especially made for target shooting, and it is chambered for the 7.62mm NATO (308 Winchester) cartridge.

I first read about the Sportco M44 rifle in the September, 1970, issue of *The American Rifleman*. The short article by well-known British author and target shooter E.G.B. Reynolds, describes the rifle in considerable detail. However, the rifle he describes is a bit different from the one shown here which was purchased new in Canada in 1973. Reynolds' rifle evidently was an early version, while the one shown here is the regular production model.

The Sportco M44 rifle was manufactured by Omak Australia, Ltd., Clovelly Pk., South Australia. It was once available to U.S. shooters through major Canadian arms dealers throughout the provinces. It is no longer made. There are other variations of this rifle than the one E.G.B. Reynolds described, and the one I am about to describe, but because I have only ever seen one I will describe only that one.

The Rifle

The accompanying chart gives the general specifications of the Sportco M44 rifle. It is a 10-pound, bolt-action, single shot rifle intended primarily for the big bore, long range, slow-fire target shooter. Fitted with the excellent Parker-Hale micrometer rear sight and globe front sight, and except for the sling, the rifle is ready for the range. The stock is well proportioned for the prone position with a straight, high and fairly thick comb, well rounded full pistol grip, and a forend long and full enough to satisfy most shooters. The stock is fitted with a soft composition bumpplate and with enough pitch so the butt won't tend to slip down while shooting. There are six threaded studs in the bottom front of the forend so that the front sling swivel can be positioned anywhere from 13 1/2" to 17" ahead of the trigger. The rear swivel is attached to the front guard screw. The top of the rear part of the barrel is covered by a wood hand-

guard. The stock is laminated in three layers, smooth and well sanded, and is made of straight-grained wood (probably teak).

The barrel is what might be termed a heavy sporter weight, with a muzzle diameter of about .685". The breech section is 1.250" in diameter when it joins the receiver, and from then it is gracefully contoured and tapered to the muzzle. The barrel is 26.5" long. The front sight mounts on a dovetailed block that encircles the muzzle and is pinned to it. The rear sight is attached to the receiver bridge by two screws which are ample in size to do the job. The barrel is completely floated inside the forend and handguard. The metal parts are quite well finished and blued.

The Action

The receiver appears to be a single piece of thick-walled steel tubing. The front end is threaded to receive the barrel, the rear end sloped off to form a tang, and a narrow opening is milled out in its right center for the loading port. The heavy recoil lug is threaded to the barrel and is held between the barrel and the receiver. The receiver, as well as the receiver-barrel joint, is very rigid and provides a very good support for the free-floated barrel. The action and barrel assembly is securely held in the stock by the front and rear guard screws. The rear screw goes through the rear end of the trigger guard and threads into the receiver tang, and the front screw goes through an escutcheon in the stock and into the recoil lug.

The bolt body is a hollow tube, with the very low profiled bolt handle attached to its rear end. The bolt handle is not unlike the one on the Model 700 Remington; it is quite short. The root of the bolt handle serves as the safety locking lug by engaging into a deep notch out into the receiver. The bolt head is a separate part of the

(Above) The Sportco Model 44 single shot target rifle.



Close-up view of the Sportco M44 action.

bolt and is detachable and interchangeable via an easily removable pin for headspace adjustment. This pin is held in place by the firing pin, which passes through it. The bolt head has three solid locking lugs spaced evenly around its front end and these lugs engage in matching locking recesses in the breech of the barrel. Thus, the bolt is locked to the barrel rather than the receiver. Locking and unlocking the bolt requires that it only be rotated in a 60-degree arc. The bolt head is fully recessed for the cartridge head. Located between two of the locking lugs on the bolt head is the simple spring-tensioned pivoted hook extractor. Inside the bolt face recess is the simple ejector, a spring-activated plunger. The bolt is vented, with the hole opening to the right in the forward part of the loading port.



Left-side view of the M44 Sportco action showing the Perko-Hale micrometer target sight.



Close-up of the M44 Sportco with action open. To load, the cartridge is merely dropped into the loading port and the bolt closed. The forward locking lugs on the bolt engage in matching locking recesses in the barrel.

PART II: Commercial Rifles & Actions



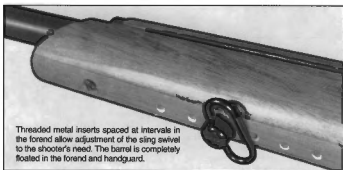
Right side of the M44 action. The recoil lug is threaded on the barrel shank and fits between the barrel shoulder and the receiver.

The firing mechanism in the bolt is also simple. The bolt sleeve threads into the rear of the bolt body. The rear end of the one-piece firing pin slips through the bolt sleeve and to its end is fitted the cocking piece, held in place by a pin. The coil mainspring is compressed over the firing pin between the bolt sleeve and a collar on the front of the pin—all very similar to the M700 Remington firing mechanism. The M44 cocking piece has a slot in its end into which a coin can be slipped to facilitate easy removal of the firing mechanism from the bolt.

The bolt-stop is a simple lever pivoted on a pin in a slot cut into the rear left of the receiver wall. It is spring tensioned and has a serrated thumb-piece so that it can be depressed to disengage its front end from the bolt in order to remove and replace the bolt. Its front end projects into a narrow groove cut lengthwise in the bolt body, and it not only stops the bolt travel when the end of the groove contacts the end of the bolt stop, but also serves as a bolt guide to prevent the bolt from rotating when it is being opened and closed. A simple arrangement, but quite good.

The trigger mechanism is built into a steel housing fitted in a slot in the bottom rear of the receiver, and held in place by two cross pins. This mechanism is not unlike the one in the Remington Model 700, except that the safety mechanism is quite different.

The trigger mechanism is composed of the sear lever, which partly projects into the cocking piece roadway in the receiver, and which contacts the cocking piece to hold it back. Directly below the sear lever is the trigger, and when the action is cocked the trigger holds the sear up to keep the cocking piece back. There is a spring for the sear lever and the trigger, and an adjustment screw behind the trigger spring to adjust the weight of pull required to release the trigger. There is also a screw to adjust and limit the trigger over-travel, and another to adjust the amount of sear engagement. None of these adjustment screws are accessible from the out-



Threaded metal inserts spaced at intervals in the forend allow adjustment of the sling swivel to the shooter's need. The barrel is completely floated in the forend and handguard.

side of the assembled rifle; the stock has to be removed to make any adjustments.

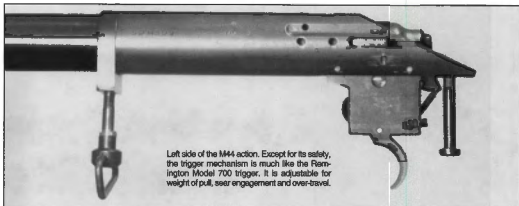
The safety mechanism consists of a rotary disc fitted to the right side of the receiver tang by a screw, a rotary cross bolt through the bottom of the trigger housing, and a spring tensioned arm to connect these two parts. When the safety is rolled back, the rotary bolt blocks the trigger so that it cannot be pulled back. There is a screw through this bolt to allow for fine adjustment against the trigger to limit trigger movement. When the safety is engaged it blocks only the trigger. (The same safety system was used in all models of the Kimber rifles.) The trigger is grooved and the trigger plate and guard bow are heavy sheet metal stampings.

Comments

I have not talked with anyone who has used the M44 Sportco for competitive target shooting, so I can't convey their opinions and thoughts on it, but from what I have seen on just one M44, to me it appears to be a very serviceable arm for this sport, and I see no reason why it shouldn't be highly accurate. Almost everything about the rifle seems to have been

well thought out, well designed and well made. I am sure that anyone who is an experienced and skilled target shooter could do a very creditable job with it on the range. It has a lot going for it. It is just about ideal in every respect: weight, length, size, etc. It has not an ounce of surplus weight or bulkiness. The stock is ample in proportions for a comfortable prone position. The rear sight is correctly positioned and there is enough spacing between the sights for precision aiming. The trigger is excellent. The action is easy to operate, works smoothly, and loading is a snap—just lay a cartridge in the receiver and close the bolt. Lock time is very fast and ignition positive. I like the M44's rigid receiver and barrel joint, and the floated barrel. I like the locking arrangement, as well as the replaceable bolt head idea.

There is one thing, however, that I do not like about this rifle, and that is the safety. In the first place, a target rifle does not need a safety—an open bolt is the best safety and the only one that should ever be used on the target range. Regardless, the safety on the particular M44 I had did not work unless the trigger is adjusted with a lot of sear engagement. I could see no way it could work and be safe. It



Left side of the M44 action. Except for its safety, the trigger mechanism is much like the Remington Model 700 trigger. It is adjustable for weight of pull, sear engagement and over-travel.



The Model 44 Sportco bolt head. It has three solid locking lugs, is fully recessed for the cartridge head, and is readily detachable from the bolt body—held in place by a large pin through which the firing pin passes.

would have been better had the designers put the rotary safety bolt under the sear lever to block it, rather than trying to block the trigger. Better yet would be a safety that locked the striker, and better still, on a target rifle, is to have no safety at all.

The Sportco M44 is a "plain Jane" gun, made purposely so in order to keep the price down. It has all the needed essentials for top accuracy and reliable performance. Except for the safety, it has no frills or useless accoutrements that would do nothing for the rifle except add to its cost. In short, it is a pure and basic tar-

get rifle and it looks very good to me. It was awarded the "Good Design Label" by the Design Council of Australia.

I have probably made the Sportco M44 look

better than it is, and have overlooked the fact that it could be improved. This could be done, but only at a price. Anyway, sometime in the late 1970s, the M44 was discontinued and replaced by an improved version named the Angel Model 80. This new target rifle has essentially the same action as the M44 but with a different barrel and stock. The separate recoil lug was eliminated and two cross bolts through the stock now serve as the recoil lugs—the receiver evidently grooved to fit over them. The action is now secured in the stock by three screws instead of two. Schultz & Larsen barrels with a 1:14" rifling twist were used and there are no finer match barrels than those. The main change in the stock is the addition of a stop rail inletted into the forend. I have not seen this new rifle and therefore cannot be sure of all its improvements, but I was told by a shooter who has used one that it took over where the Sportco M44 left off.

Sportco M44 Rifle Specifications

Caliber	7.62mm NATO (308 Winchester)
Weight	Approx. 10 lbs. with sights and swivel.
Barrel length	26.5"
Rifling	4 grooves, right-hand 1:12" twist. (Also made in 1:14" twist for Canadian and New Zealand military ammunition)
Groove diameter	.308"
Overall length	45"
Sights	Parker-Hale micrometer aperture rear, globe front.
Stock	Straight-grained, laminated, with handguard. 13.5" length of pull. Front swivel adjustable for length.

General Specifications

Type	Turnbolt single shot.
Receiver	One-piece machined steel, unskotted bridge, solid bottom.
Bolt	Two-piece with detachable head.
Ignition	One-piece firing pin powered by coil spring. Cocks on opening action.
Trigger	Single-stage, adjustable for weight of pull, take-up and over-travel.
Safety	Rotary safety, locks trigger.
Extractor	Pivoting hook type mounted in bolt head.
Bolt-stop	Pivoting lever mounted in receiver bridge, with forward end engaged in a groove in the bolt body.
Ejector	Spring-loaded plunger mounted in bolt head recess.

Dimensional Action Specifications

Weight	(estimated) 45 oz.
Length	7.500"
Receiver ring diameter	1.367"
Bolt body diameter	.746"
Bolt travel	3.800"
Striker travel	.218"
Guard screw spacing	6.750"
Bolt face recess:	
Diameter	.486"
Depth	.143"
Guard screw thread	1/4-28



Steyr-Mannlicher Model SL Rifle

AROUND 1864, IN the city of Steyr, Austria, an arms factory was established to make military firearms. It was not long afterward that they branched out and began to make sporting arms as well. In an earlier chapter, I introduced two men whose names have long been synonymous with one of the sporting rifles this firm made, a sleek tumbolt repeating rifle having a rotary magazine, short barrel and a slim forend which extended to the muzzle—namely, the Mannlicher-Schoenauer. This firm, now greatly expanded and diversified, is still making rifles under the name of Steyr Daimler Puch. When the Mannlicher-Schoenauer rifle was discontinued in the late 1960s, it was replaced with one of more modern design, the now-familiar Steyr-Mannlicher. The SL model described in this chapter is but one of several models of Steyr-Mannlicher rifles being made.

Ferdinand von Mannlicher and Otto Schoenauer were firearm designers: Mannlicher became famous for the many military rifle actions he designed, but it was the rotary magazine that Schoenauer is best known for. The Mannlicher-Schoenauer rifle was based on an action design of Mannlicher's, but the magazine in it was Schoenauer's. As time went by and the Mannlicher-Schoenauer rifle became popular, it was because of its short barrel, full-length slim forend, and, in time, that style became known as the Mannlicher forend. It is that way today—mention "Mannlicher" to the average rifleman and he will no doubt connect that name with a full-stocked, short-barreled hunting carbine. It is not known who designed the original Mannlicher-Schoenauer sporting stock, but it probably was not Mannlicher. Anyway, what I am leading up to is that the Steyr-Mannlicher rifle should have been named the Steyr-Schoenauer instead. There is nothing "Mannlicher" about this rifle, but the magazine belongs to Schoenauer. Be that as it may, Mannlicher is a good name to tack on to any rifle and Steyr's present line

of tumbolt sporting rifles is a fine line to bear that name.

The Steyr-Mannlicher SL was introduced in the U.S. in 1967, and at that time was imported by Stoeger Arms Company. For the past few years these rifles have been imported and distributed by GSI, Inc. of Trusseville, Alabama. The letters "SL" stand for Super Light, and a super light rifle it is. It was designed and made especially for the 222 family of cartridges and Steyr did a fine job of it. Almost every shooter who sees and handles this rifle for the first time will remark favorably about its looks, lightness and feel. It is that kind of rifle.

The SL Rifle

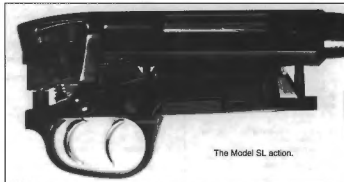
The Steyr-Mannlicher Model SL rifle averages about 6.5 pounds in weight and is 42.5" in overall length. It is fitted with a standard-weight, sporter contoured barrel 23.6" long, with a breech diameter of 1.180" and a muzzle diameter of .600". In 1994 it was available in calibers 222, 222 Magnum or 223 (5.6x45mm). The entire rifle is sized for these cartridges. There are open sights mounted on the barrel, a blade front mounted on a hooded ramp, and a U-notched rear

dovetailed into a base.

The barrel is rifled by the hammer-forging method, a process used by a number of rifle manufacturers. When the rifling has been properly formed by other manufacturers, the barrel is removed from the machine to be crowned, threaded, chambered, finish ground on the outside and fitted to the action. But Steyr omits one of these operations—they alone leave the outside of the barrel as it comes out of the rifling machine—with all the hammer marks showing. And, believe it or not, it is a striking, or rather an eye-catching finish with row upon row of oval hammer marks swirling around the barrel. It is a beautiful finish.

Steyr uses fine walnut to make the stocks for their sporting rifles and the piece of wood on my SL rifle is no exception. It is dense

(Above) The Model SL Steyr-Mannlicher half-stock sporting rifle. As shown this rifle weighs only 6.5 pounds and the model letters SL stand for Super Light. In any one of its three calibers, namely the 222, 222 Magnum, or 223, 5.6x50 Mag. It makes an excellent lightweight varmint rifle.



The Model SL action.



The action opened.

and hard, with a wavy figure through most of it. My photographs do not do it justice. It was machine inletted with precision for a close fit between metal and wood. The shaping was probably done by machine also, and all the final finishing done by hand. As I have grown older I have also grown fussy about the stocks on my rifles, and, just as I like the barrel on my SL rifle, I also like the stock very much. If I had shaped and finished this stock myself there would be only one minor change that I would have made, and that would be in the forend. As Steyr shaped it, the forend decreases in width very noticeably just in front of the action, before it begins to taper toward the tip. I would not have made the side dips into it, but would have made it a straight taper from the widest part over the action to the tip. Regardless, Steyr did a wonderful job of it. The surface of the stock is sanded dead level and very smooth. The oval grip cap, which appears to be made of horn, is perfectly fitted and its edges are even with the wood. The same is true for the rubber butt pad. And there is the oil finish that I admire, and the perfect job of checkering. I especially like the shape of the

pistol grip and the cheekpiece.

There are three variations or types of the Steyr-Mannlicher SL. They are the SL half-stock sporter with open sights on a 23.6" barrel, the carbine model with open sights on a 20" barrel and a full length stock, and the varmint model with varmint-style stock and a 25.6" heavy barrel without sights. The varmint model is chambered only in the 222 caliber, while the other two are made in 222, 222 Magnum, and 223 calibers. All three have identical actions. There are several other models of Steyr-Mannlicher rifles on longer actions than the Model SL, and in a large variety of American and foreign calibers from the 22-250 to the 458 Win. Magnum. Except for size, all the Steyr-Mannlicher rifles have essentially the same action and a description of one should suffice for the others.

The SL Action

The receiver is machined from a single piece of steel. It is round on top with a radius of .590". The sides of the receiver are flattened making its width 1.180". At the bottom it is mostly rounded except at the magazine well opening and at the rear where the recoil

lug is located. This lug is rather massive with a flat rear surface approximately .575" x .750", which is more than adequate to prevent the barrel and action from moving rearward in the stock upon firing the rifle.

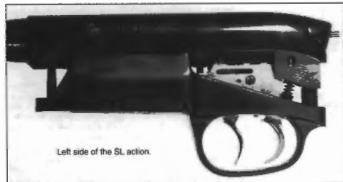
There is also an adequate flat area on the bottom of the lug and receiver at this point to provide a solid bottoming of the receiver in the stock. Wall thickness of the receiver at the top radius is about .215". Four scope mounting screw holes are provided with metric threads.

The barrel has a flat breech end and it is threaded tightly into the receiver. Both the magazine well and the ejection port are narrow and small, but adequate to allow the cartridges to pass through them. The magazine well is positioned slightly to the left of the center line of the receiver and the ejection port opens to the right side.

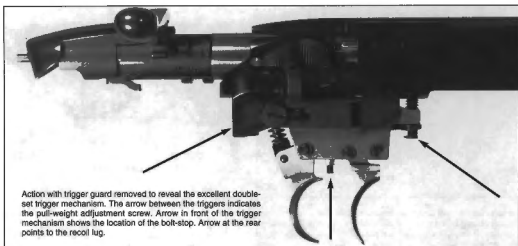
The bolt proper is of two-piece construction, the bolt body and the bolt handle sleeve. On this short sleeve are the three rows of locking lugs, two lugs on each evenly spaced row. These lugs engage in matching recesses inside the rear part of the receiver. Bolt lift is a short 60-degrees.

Of rather unusual shape, the bolt handle is neither flat, spoon, butter-knifed, or curved, nor a combination of any of them. It seems to have started out as a straight, round and slightly tapered handle and then the outer part of it, except the end, ground flat. I would not want this bolt handle on all of my turnbolt rifles, but on this lightweight it is not at all bad. In fact, I rather like it.

The one-piece firing pin (striker) has a short threaded section and threaded on it is the double-headed cocking cam. The coil mainspring is positioned between the cocking cam and a collar on the firing pin, and small set-screw threaded in the lower part of the cocking cam prevents the firing pin from turning. A U-shaped fork positioned on the rear end of the firing pin and over the cocking cam compresses the mainspring when the bolt is



Left side of the SL action.



Action with trigger guard removed to reveal the excellent double-set trigger mechanism. The arrow between the triggers indicates the pull-weight adjustment screw. Arrow in front of the trigger mechanism shows the location of the bolt-stop. Arrow at the rear points to the recoil lug.

assembled. Dual opposed cocking cam notches on the rear of the bolt handle sleeve engage the cam surfaces on the cocking cam, which slides in a slot cut into the rear of the bolt body. Everything is held together by the bolt sleeve, which engages in a circular groove at the rear of the bolt body to place the firing pin under tension when it is cocked by the upturn of the bolt handle. An extension on the rear of the firing pin, extending through the rear of the bolt sleeve, serves as a cocking indicator. The bolt sleeve is a very complex piece of machine work. It includes a projection that contains a spring-backed plunger and which, when the bolt is closed, fills the bolt handle slot in the receiver. Also, when the bolt handle is raised it holds the bolt handle in that position until the bolt is closed and locked. The bolt sleeve not only closes the rear of the bolt, but also closes the rear end of the receiver when the action is closed. Only the bolt handle sleeve rotates when the bolt handle is raised and lowered, the bolt body does not rotate with it.

The face of the bolt body is recessed for the cartridge head, and on the edge of it is fitted the spring-backed ejector plunger. The extractor is a slender piece of spring steel dovetailed lengthwise into the side of the bolt. This extractor is very similar to the ones used in the Italian Carcano and Model 1922 22-caliber U.S. Springfield.

The trigger mechanism is built into a lightweight alloy metal housing. It fits in a recess machined into the bottom of the receiver and is held in place by two pins. The entire double-set mechanism has a weight of pull adjustable down to a few ounces. To use it, the rear or cocking trigger is pulled back until it is cocked; touching the front trigger releases

the cocked rear trigger which, in turn, releases the sear and striker. Or, the rifle can be fired by merely pulling the front trigger which has a normal weight of pull of about three to four pounds. This indicates that the trigger mechanism is an intricate one, with several springs, pins and other parts. The small set-screw positioned between the two triggers is to adjust the weight of pull for the set trigger only.

Besides the trigger mechanism, the trigger housing also contains the bolt-stop mechanism. The bolt-stop is similar to the sear and the bottom of the bolt body is grooved for it. In addition to halting the bolt in its rearward travel, the bolt-stop also prevents the bolt body from rotating. To remove the bolt from the receiver, the front trigger is pulled back about as far as it will go and the bolt pulled out.

The safety is positioned on the right side of the receiver where, if it is slid to the rear, it locks the sear and the bolt. If it is pushed forward, the rifle can be fired and the bolt operated. There is a pronounced click when it is engaged, but it's nearly silent when disengaged. It appears to be well built throughout with plenty of serrated and hollowed surface to slide it backward and forward.

The trigger guard and magazine holder is a single piece of moulded black nylon or plastic. Guard screws through holes at each end, and threaded into the receiver, anchor the barreled action in the stock. The trigger guard moulding is a complicated affair with an opening in it to accept the rotary magazine. The magazine is also a precision moulding of a black material. Inside it is a spring-tensioned rotary spool. The rear end of the magazine is clear plastic and the heads of the cartridges

inside can be seen through it. At the bottom of the magazine are two spring-backed latches that engage in slots in the magazine holder to hold the magazine in place and to allow for its quick and easy removal. Although I dislike plastic or nylon parts on any gun, these parts seem somehow to belong.

The receiver and bolt sleeve are highly polished and blued. Not blued, but highly polished are the bolt body and the triggers. The trigger guard and the magazine are a dull black.

Markings

My SL Steyr-Mannlicher rifle is marked as follows: On the left side of the receiver is stamped:

STEYR - MANNLICHER - SL

On the center left of the barrel:

STEYR, SECAUCUS, NJ

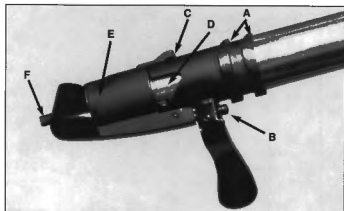
The caliber is stamped on the left side of the barrel. The serial number is on the right side of the receiver ring, under the barrel and the last two numbers are on the bottom of the bolt handle. MADE IN AUSTRIA is stamped on the right side of the receiver.

Takedown and Assembly

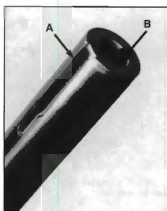
Make sure the rifle is unloaded by opening the bolt and removing the magazine.

To remove the bolt, push the safety forward to disengage it, raise the bolt handle and pull the bolt rearward, then pull the front trigger back as far as it will go and remove the bolt.

To disassemble the bolt proceed as follows: Grasp the bolt body firmly in one hand and with the thumbail of that hand or with a



Rear end of bolt showing: (A) two of the six locking lugs on bolt handle sleeve, (B) bolt sleeve lock plunger, (C) cocking piece, (D) one of the dual cocking cam notches, (E) bolt sleeve, and (F) cocking indicator.



The Steyr-Mannlicher SL bolt head showing: (A) one-piece extractor, and (B) ejector.

piece of wood, fully depress the plunger in the root of the bolt handle. With the other hand rotate the bolt sleeve counterclockwise 180 degrees or until it snaps free of the bolt. With the bolt sleeve removed, the firing mechanism and the bolt handle sleeve can be removed from the bolt. It is not advisable to remove the mainspring, but if this is necessary, first carefully measure the distance from the rear of the cocking cam to the tip of the firing pin, so that on reassembly you can return the cocking cam to the same position and thus not alter the firing pin tip protrusion. Loosen the set-screw in the cocking cam and unscrew the firing pin from the cam. Reassemble the remainder of the bolt in reverse order. This is best done by having the firing pin and cocking cam fully forward in the cocking cam notches. Then, with the front of the bolt on the bench top or the bolt body held firmly in a padded vise, place the bolt sleeve over the rear end of the firing pin with its extension opposite the root of the bolt handle, at a point where the bolt sleeve can be fully pushed forward to compress the mainspring, and rotate it clockwise until the forward extension is about 90 degrees from the bolt handle. Using a tool such as a screwdriver, draw back the cocking cam while at the same time rotating the bolt sleeve until it engages with the bolt handle. The firing pin is now cocked and the bolt can be reinserted into the receiver.

To remove the barrel and action assembly from the stock, turn out the rear guard screw and then the front guard screw and carefully lift the barrel and action from the stock. The trigger guard and the trigger plate can then be removed from the stock. Never remove the trigger mechanism or disassemble it unless you are skilled in this work. To reassemble

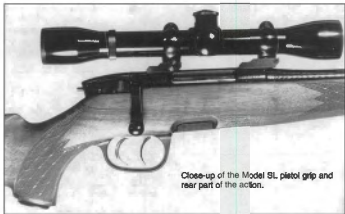
the barrel and action into the stock again, first place the small trigger plate in place on the trigger mechanism and the trigger guard in the stock, and then carefully reinsert the barrel and action into place and turn in the guard screws.

Comments

After reading the NRA Dope Bag report on the Steyr-Mannlicher SL rifle in the March, 1968 issue of *The American Rifleman*, I noted that some changes have been made in the rifle since then. For one thing, the sights have been improved and now there are both windage and elevation adjustments that can be easily made. The white line spacers have been omitted and the stock fitted with an excellent solid rubber buttpad. The safety has only two positions, rather than three as in the first rifles. However, the greatest improvement is in the

magazine catches. Previously, it required two hands to remove the magazine with the magazine catch located in front of the trigger guard bow. However, on my gun, with twin catches built into the bottom of the magazine, it is quickly and easily removed and replaced with one hand.

I would like to see a further change made, one that would strengthen the stock. The stock wood over the action is quite thin with the result that the forend is not very rigid. If my advice were followed there would be a small block attached to the underside of the barrel, with two screws about 3" ahead of the receiver and threaded to accept a forend screw. The block would be closely bedded into the forend to serve as a pressure point and as a recoil lug, and the channel ahead of it would be made free of contact with the barrel.



Close-up of the Model SL pistol grip and rear part of the action.

PART II: Commercial Rifles & Actions



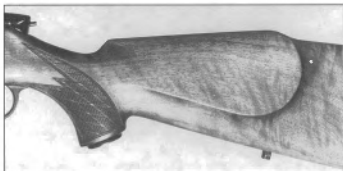
Left side of the Model SL Steyr-Mannlicher rifle. The Bushnell 4X scope is mounted in Buehler two-piece mounts.

(Right) The SL cheekpiece on the SL stock. Note its clean lines.

I would not mind at all if my SL rifle weighed 8 or 10 ounces more, if that weight was in a highly polished steel trigger guard made by the investment casting process. Still, I do not mind too much that the guard and magazine are made of a black plastic, because, to most shooters, its lightness probably gives the rifle more class than would the heavier polished steel guard.

Although I believe that almost all users of the Steyr-Mannlicher rifle will want a scope on it, the manufacturer nevertheless installs a set of fine open sights. The parts of both front and rear sights are steel and both are attached with cap screws to the barrel. A shooter with good eyesight should be able to aim very accurately with these sights.

The rear sight is a U-notched blade dovetailed into a base. This blade is angled forward. The face of the blade is dull black to eliminate light reflections. Windage adjustment is easily made by loosening the screw on top of the base, moving the sight to one side or the other, and then tightening the screw to lock the blade in place. The entire sight can be removed by first removing the blade and then turning off the cap nut underneath and turning out the threaded stud from the barrel. To adjust the sight for a windage error, move the blade in the direction you want the group to move.



The front sight is a hooded blade mounted in a ramp base. The blade is adjustable for elevation; turning the screw at the rear of the blade clockwise will raise the group, counter-clockwise will lower it. To remove the entire sight, first drive out the pin, that holds the blade in place, remove the blade, and then unscrew the cap nut underneath and the threaded stud from the barrel.

As mentioned earlier, I would like the forend made in a straight taper instead of being dished ahead of the receiver. I would also like the action and the trigger guard placed from $1/4"$ to $3/8"$ farther forward in the stock or that much farther ahead of the pistol

grip. This would, I believe, improve the looks a bit.

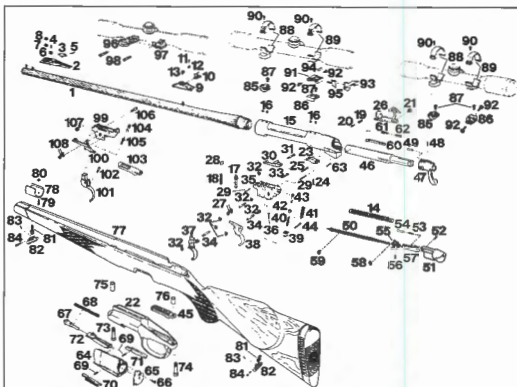
I sold my Model SL half-stock to a friend and it is one of the few rifles described in this book which was tested for accuracy. In this rifle, which was chambered for the 223, and using Federal ammunition, practically every shot of two boxes of ammunition stayed well within a 1-inch circle at 100 yards. The sighting was done with a 4x Bushnell scope. If a better and higher powered scope had been used, and if the firing had been done on a bench rest instead of over a log, many of the five-shot groups would have printed .500" or less.

Dimensional Action Specifications

Receiver length	7.082"
Receiver width	1.180"
Bolt diameter	.745"
Bolt travel	3.000"
Striker travel	.250"

General Specifications

Style	..... Turnbolt repeater.
Receiver	..... One-piece steel construction, integral recoil lug drilled and tapped for scope mounts.
Bolt	..... Two-piece construction, recessed bolt head, non-rotating bolt body, six locking lugs in three rows on bolt handle section, cocks on opening of bolt.
Ignition	..... One-piece striker, coil mainspring.
Extractor	..... One-piece spring claw dovetailed into bolt body.
Ejector	..... Spring-backed plunger in bolt face recess.
Trigger	..... Double-set mechanism, adjustable, in combination with single-stage trigger.
Safety	..... Sliding safety locks sear and bolt.
Bolt-stop	..... Sear-like bolt-stop in bottom of receiver, released by front trigger.
Magazine	..... Detachable box magazine with rotary spool. Five-shot capacity.



Parts Legend

1	Barrel	28	Slide Lock	58	Bolt Guide Washer	87	Scope Mount Base
2	Front Sight Ramp	29	Trigger Housing Pins	59	Striker Cirdip	88	Screws
3	Front Sight Blade	30	Set Trigger Sear Lever Pin	60	Extractor	89	Front Scope Rings
4	Front Sight Blade Spring	31	Set Trigger Sear Lever Pin	61	Ejector	90	Rear Scope Rings
5	Front Sight Pin	32	Circlip	62	Ejector Spring	91	Scope Ring Screws
6	Front Sight Blade Spring	33	Trigger Stop Pin	63	Ejector Pin	92	Wingbase
7	Front Sight Ramp Washer	34	Trigger Pins	64	Magazine Body	93	Wingbase Base Screws
8	Front Sight Ramp Nut	35	Trigger Housing	65	Magazine End Cap	94	Rear Scope Mount Slide
9	Rear Sight Base	36	Trigger Adjusting Screw	66	Magazine End Cap Screw	95	Wingbase Slide Spring
10	Rear Sight Blade	37	Standard Trigger	67	Magazine Rotor Axis Pin	96	Rear Mount Slide Springs
11	Rear Sight Screw	38	Set Trigger	68	Magazine Follower Spring	97	Front Mounting Rail Base
12	Clamp Ring	39	Trigger Coupling Link	69	Magazine Catch Spring	98	Dovetail Base Screws
13	Rear Sight Base Nut	40	Internal Set Trigger Spring	70	Left Magazine Catch	99	Standard Trigger Housing
14	Main Spring	41	External Set Trigger Spring	71	Right Magazine Catch	100	Standard Trigger Sear
15	Receiver	42	Trigger Coupling Link	72	Magazine Follower	101	Lever
16	Scope Mount Filler Screws	43	Locking Screw	73	Front Trigger Guard Screw	102	Single Trigger
17	Bolt-stop	44	Trigger Coupling Pin	74	Rear Trigger Guard Screw	103	Standard Trigger Set
18	Bolt-stop Spring	45	Set Trigger Insert	75	Front Trigger Guard	104	Standard Trigger Spring
19	Safety Catch Detent	46	Bolt Body	76	Screw Bushing	105	Standard Trigger
20	Safety Catch Detent Spring	47	Bolt Handle	77	Rear Trigger Guard Screw	106	Adjusting Screw
21	Safety Catch Retaining	48	Bolt Handle Pin	78	Bushing	107	Standard Trigger
22	Trigger Guard	49	Bolt End Cap	79	Stock	108	Eccentric Screw
23	Slide	50	Bolt End Cap Pin	80	Forend Tip	109	Stand Cap
24	Sear Spring	51	Bolt End Cap Spring	81	Forend Tip Screw Nut	110	Eccentric Screw
25	Sear Pin	52	Bolt End Cap Detent	82	Sling Swivel Stud	111	Eccentric Screw Nut
26	Safety Catch Slide	53	Bolt Guide	83	Bolt Guide Washer	112	Standard Trigger
27	Trigger Return Spring	54	Blanking Screw	84	Front Scope Mount Base	113	Return Spring
		55	Bolt Guide Sleeve	85	Rear Scope Mount Base		



Texas Magnum Rifle

RANGER ARMS INC. introduced an exceedingly fine centerfire tumbolt rifle action in 1967. Its design, construction and workmanship was excellent. Ranger offered several actions, long, short, a single shot and, right- or left-hand versions. All were available separately too, and Ranger also furnished barreled actions in many popular calibers, plus complete custom-built rifles in several grades.

Let's see what these were (the Ranger Arms Co. is no longer active). 1) The Texas Magnum was the long action, about 9" overall without recoil lug. Its magazine will accept cartridges of 30-06 length or slightly longer, and it was made for these and short belted magnum cartridges. The magazine was not long enough for the 300 or 375 H&H Magnum cartridges. 2) The Maverick action, about 8.375" long, was made for cartridges of 30-06 head size and no longer than about 2.850". This would include the 308, the 6mm and 284, etc. The Maverick single shot, without magazine or magazine well, was made for 30-06 head-sized cartridges, in addition to the 222 family. Any of these was available for right- or left-hand operation.

Design and Construction

Texas Magnum (TM) actions are of all-steel construction. The receiver and bolt are machined from solid round bars of SAE 4340 steel, an alloy of chrome, nickel and molybdenum steels. Such parts as the trigger, sear and cocking piece are steel investment castings. The magazine box and trigger housing walls are formed from sheet metal.

The one-piece receiver is round. The receiver ring is about 1.550" long, its front end threaded for the barrel shank. The barrel shank is 1.00" in diameter and about .990" long. The threads are right hand and of standard 60-degree V-type, 14 threads per inch. The separate recoil lug, clamped between receiver and barrel, is big enough to prevent set-back of the barrel and action in the stock from recoil. A narrow notch at the bottom of

the receiver matches a projection on the recoil lug. This aligns the lug with the receiver and keeps it from turning when the barrel is turned into the receiver.

The receiver is precisely bored and reamed for the bolt. The unslotted bridge, about 1.220" long, is flat on top. Two holes are tapped into the receiver ring and bridge for scope mounts. The receiver ends in a rounded tang.

The large diameter (.859") bolt lugs do not project, and for this reason no lug raceways have to be cut into the receiver. As a consequence, the wall opposite the loading port is a solid, curved wall of steel about .225" thick and nearly 1" high. Cartridge guide lips are milled in the sides of the magazine well opening. The magazine wall or rail below the receiver opening is thus left quite thin—not unlike that in the Remington 721 action, but the opposite solid wall in the TM action makes up for it.

The front of the bolt body is turned down, leaving three solid locking lugs to engage behind shoulders inside the receiver ring. These lugs are about .085" thick, the bottom one wider than the other two. The approaching corners of the lugs and shoulders are slightly angled, hence the bolt is cammed forward a short distance when the handle is lowered. Because of the triple locking-lug design, bolt rotation to open and close is only 60-degrees.

The bolt face is deeply recessed for the cartridge head. The spring-plunger-type ejector is held in place in the bolt face by a small cross pin through the bolt. The hooked extractor occupies a groove cut into the outside of the bolt head, held in place there, and pivoting on, another pin through the bolt head. The extractor is powered by a small coil spring. The extractor hook and edge of the bolt face are well beveled so the bolt can easily be closed on a chambered cartridge.

The bolt handle, threaded into the rear of the bolt body, is locked in place by two small Allen-head set-screws. The bolt handle stem is curved back and down, ending in a pear-

shaped ball. Its very low profile will clear the lowest-mounted scope.

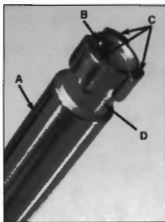
The very stiff coil mainspring is compressed between a shoulder on the front of the one-piece firing pin and the bolt handle. The rear end of the firing pin projects through the bolt handle; the cocking piece is threaded onto it. Firing pin tip protrusion is adjusted to .055", then locked by a single Allen-head set-screw, turned in the cocking piece and onto the firing pin. The cocking piece has three cocking cams, these engaging three notches in the rear of the bolt handle. On raising the bolt handle, the action is cocked, the cocking cams moving into the very shallow notches and preventing the bolt shroud and cocking piece from turning when the bolt is opened. The multi-cam arrangement eliminates torque, making it easy to open the bolt. The neatly shaped steel bolt head shroud threads onto the rear of the bolt handle and entirely covers the cocking piece.

The receiver tang is notched for the bolt handle, which forms the safety lug. Initial extraction camming power is supplied on raising the bolt handle, when the base of the handle moves over an inclined surface on the rear of the bridge.

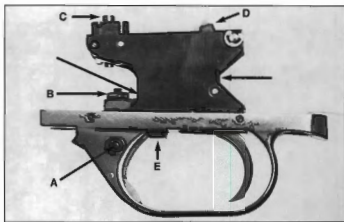
Texas Magnum actions have a good gas venting system. There are two holes in the receiver ring (one on each side) and three holes in the exposed side of the bolt body. I don't see how any gases could escape through the hole in the bolt handle, but if this occurred the bolt shroud would protect the shooter.

The trigger and bolt-stop mechanism is built into a separate steel housing, which is in turn attached to the milled steel trigger guard by two pins. The curved and grooved trigger is placed well back in the trigger guard bow. The top of the trigger engages the sear, the latter pivoted in the tip of the housing. The trigger and sear are tensioned by small coil springs. When the action is closed, the sear, which is

(Above) The Texas Magnum rifle built by the Ranger Arms Company.



Texas Magnum bolt head showing: (A) bolt-stop groove, (B) ejector, (C) triple locking lugs, (D) extractor.



Texas Magnum bolt-stop/trigger/safety assembly, showing: (A) cross-bolt safety, (B) safety adjustment screw and locknut, (C) bolt-stop plunger, (D) sear, (E) bolt-stop release. The long arrow (left) points to the location of the trigger weight-of-pull adjustment screw; the short arrow points to the sear-engagement adjustment screw.

held up by the trigger, holds the cocking piece back. On pulling the trigger the sear is released to tip down, releasing the firing pin. There is an Allen-head set-screw in the rear of the trigger housing by which the trigger-to-sear engagement can be set to provide a short creep-free trigger let-off. There is no adjustment for over-travel. The weight-of-pull adjustment screw is positioned just to the rear of the safety adjustment screw; by turning this Allen-head screw counterclockwise the pull can be made lighter. The trigger mechanism must be removed to make these adjustments.

The safety is a cross bolt built into the top front of the guard bow. The trigger has a forward extension fitted with a set-screw and locknut, which are in contact with the safety when it is engaged. The trigger and safety are adjusted correctly at the factory, but if any change has been made with the trigger adjustment screw, the safety set-screw must be re-set so that no trigger movement is possible when the safety is engaged. On right-hand actions the safety is disengaged by pushing it to the left with the trigger finger, vice versa on left-hand actions. There is no bolt lock. The safety can only be engaged if the action is cocked, thus it can be used as a cocking indicator.

The trigger mechanism, with its attached trigger guard, is held against the bottom of the receiver by the rear and center guard screws passing through the guard and threading into the receiver. By this arrangement the trigger mechanism can be removed from the rifle without taking the barrel and receiver out of the stock.

The action is held in the stock by the front, rear and center guard screws. The front screw

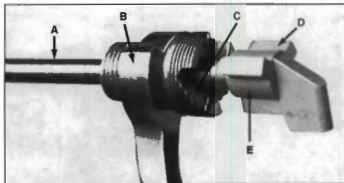
passes through a short plate, to which the milled steel floorplate is pin-hinged. This hinge plate and the front end of the guard hold the sheet metal magazine box in place against the bottom of the receiver. The floorplate latch is in the front of the guard bow, its release button inside the bow. One end of the W-shaped flat follower spring fits into lips beneath the milled steel follower; the other end merely lies within a recess in the floorplate.

The bolt-stop is a pin which projects through the bolt raceway into a milled groove in the bottom of the bolt. This pin is supported by the trigger housing spacer, which is in turn supported by being fitted into a hole in the receiver bottom. The bolt-stop pin is attached

to a forked lever (inside the trigger housing) which has an arm that projects down into the guard bow. Pushing this arm up causes the lever to pull the bolt-stop pin down so the bolt can be removed or replaced. The bolt-stop pin also acts as a bolt guide, preventing the bolt from turning as it is operated.

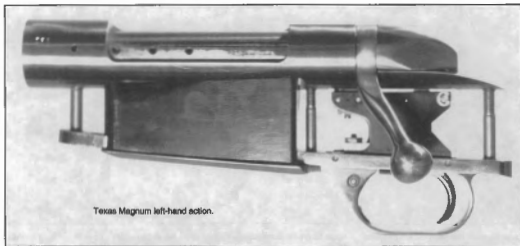
The Single Shot Action

Made especially for the serious benchrest shooter, the Texas Magnum single shot action will meet their requirements for an action that has a very rigid receiver, rigid enough to support a heavy free-floating barrel. It would be a very good action choice for the long range competitive target shooter. Made without a



Part of firing mechanism showing: (A) firing pin, (B) bolt handle, which threads into the rear of the bolt body, (C) one of the three equally-spaced cocking cam notches on the rear of bolt handle, (D) cocking piece with its three cocking cams, (E) firing pin lock screw.

PART II: Commercial Rifles & Actions



Texas Magnum left-hand action.

magazine well opening, the loading port is only wide enough to load the action. Except for the narrow loading port, the thick receiver nearly covers the entire bolt. Since no magazine is used, the trigger guard is extended forward so that the front guard screw can be fitted through its end. An additional guard screw, positioned about an inch ahead of the center guard screw, is also used to hold the action in the stock. About the only other difference in this action is that the ejector has been omitted from the bolt. It was available with bolts made for either the 222 or 30-06 head-sized cartridges.

Comments

There are many things I like about this action, but it has a few things which I believe could have been improved upon. The good things first. I think the bolt design is superb. Threading the bolt handle into the bolt body

and threading the cocking piece onto the firing pin, and locking these parts with Allen-head set-screws are excellent ideas. Designing the cocking piece with three cams is also a very good idea. The action does not really need the bolt shroud, but putting one on to enclose and dress off the rear of the bolt is well executed. I also like the beveled edge of the bolt face recess rim, the ejector with its smooth end, and I think the extractor is more than adequately strong to do its job. All bolt parts are extremely well made, machined, ground and finished so that all the parts are precisely fitted. The bolt handle is easily raised, and bolt operation is smooth, with no tendency to stick or bind.

I like the shape of the trigger guard and the hinged magazine floorplate. The trigger is nicely curved and placed properly in the trigger guard. I find nothing wrong with the cross

bolt safety or its location. The bolt-stop is adequate and the bolt-stop release is handily and inconspicuously placed. I believe the trigger mechanism is reliable, and that it should satisfy most shooters.

I've had no opportunity to test the TM action for feeding, but I assume this has been worked out and that feeding is reliable.

This is a fine action, and a very strong and safe one. To quote the Ranger Arms catalog, Texas Magnum actions are made "...to hold in excess of 140,000 psi, far beyond standards regularly available in firearms." No action has to withstand such pressures, but if any action will this is it. The three locking lug system would be hard to beat, and I doubt if any other action has a better gas venting system. The thick-walled receiver ring has not been weakened by any deep raceway cuts. This just has to be a strong and safe action.



Texas Magnum left-hand action open.



Custom sporting rifle based on the left-hand Texas Magnum action.

As a whole, I found no real fault with the TM action, but I think there's room for some improvement. For example, on the action I had, the sides of the bolt-stop groove were quite wavy. This resulted in the only roughness I felt in operating the bolt. This minor fault is easily corrected by honing the sides of this groove smooth.

Some shooters are fussy about triggers. There is no trigger stop adjustment here, but one could easily have been installed by just tapping one hole and fitting it with a set-screw.

I don't particularly like the bolt-stop. Instead of a round pin I would favor an oblong shape, which would offer more surface on each side to contact the sides of the bolt-stop groove. This would not only be stronger, but a better bolt guide, too.

Now for a thought or two about the trigger mechanism. By having the cross bolt safety built into the guard bow it is almost necessary that the trigger mechanism also be attached to the guard. If this system is to be used, in which the trigger guard mechanism is not attached to the receiver, then I believe it might be a good idea to use stock bushings for the two guard screws holding the guard in place. If the action parts are properly inserted into the stock, and preferably glass-bedded, the trigger mechanism could be removed and replaced without disturbing the rear-cocking piece relationship. I would also want the adjustment screws positioned so they would be accessible from the outside of the rifle. Personally, in this or any other fine turnbolt action, I prefer a far simpler trigger mechanism. There is hardly a trigger system I

haven't used, and of all of them there is scarcely one more simple, foolproof and reliable than that used in the Model 70 Winchester. There are dozens of ways to modify this trigger system so that the adjustment screws can be reached from the outside, and I think such a trigger would complement the fine Texas Magnum action.

Markings

The serial number is stamped on the left side of the receiver ring, on the bolt body in the bolt-stop raceway, and on the underside of the bolt handle.

The name TEXAS MAGNUM is stamped on the receiver wall, making identification positive.

Takedown and Assembly

To remove the bolt, raise the bolt handle and pull the bolt back. Then press upward on the bolt-stop release, just forward of the trigger, and pull the bolt from the receiver. To replace the bolt, insert the bolt into the receiver, press upward on the bolt-stop release so the bolt can slip over the bolt-stop; if necessary, turn the bolt a bit until the bolt-stop pin slips into its groove.

To disassemble the bolt and firing mechanism proceed as follows: first remove the two Allen-head set-screws from the rear of the bolt body. Place the bolt body in a padded vise and, with a firm grip on the bolt handle, turn it counterclockwise out of the bolt body. Next turn out the set-screw from the cocking piece, being careful to confine the parts when the firing pin is completely turned out. Now the bolt shroud can be unscrewed from the bolt handle

and the cocking piece removed. Reassemble in reverse order. Before tightening the set-screw in the cocking piece, make sure the drilled indent in the threaded end of the firing pin is correctly aligned with the hole for the set-screw, in order to obtain the correct firing pin tip protrusion. When assembling the bolt handle in the bolt make sure the two drilled indents in the bolt handle align with the set-screw holes in the bolt body. The extractor and ejector can be removed by driving out the pins that hold these parts in the bolt head.

To remove the trigger assembly, open the floorplate, turn out the rear and center guard screws, then pull the guard, with attached trigger mechanism, from the stock. The trigger mechanism can be removed from the guard by driving out the two pins holding it in place. These pins, like the other pins in this action, are of the spring-tempered rolled type. The trigger spring is freed when the trigger mechanism is removed from the guard, so take care that it is not lost. Do not disassemble the trigger mechanism unless for a good reason, and then with care. To remove the safety, drive out the floorplate latch pin, then remove latch, latch spring, safety plunger and safety. When putting the trigger mechanism and guard back into place, the bolt should be removed from the receiver and the two guard screws tightened. To remove the barrel and action from the stock, first remove the trigger mechanism, then turn out the front guard screw, whereupon the floorplate and hinge can be removed from the stock, and the barrel and action lifted out. Reassemble in reverse order.

Disassembled Action Specifications

	Long	Magnum	Maverick
Weight	48 oz.	46 oz.	46 oz.
Receiver length	9.00"	8.375"	8.375"
Receiver diameter	1.315"		
Bolt diameter	.860"		
Bolt travel	4.925"	4.30"	
Striker travel	.185"		
Bolt face recess:			
Depth	.125"		
Guard screw spacing	8.375"	7.75"	

NOTE: The Texas Magnum single shot action is the same as the Maverick except it has no magazine. See text.

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece, machined from round bar stock (SAE-4340 steel). Non-slotted bridge. Separate recoil lug clamped between barrel and receiver. Tapped for top scope mounts.
Bolt	Two-piece type (handle is a separate part) with triple forward locking lugs. Low-profile handle acts as safety lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column box magazine with hinged floorplate. Capacity: five-shot for standard calibers, four-shot for magnum calibers. Single shot action has no magazine.
Trigger	Single-stage, adjustable for take-up and weight of pull.
Safety	Cross-bolt safety built into trigger guard; locks trigger only when engaged.
Extractor	Pivoting type in bolt head.
Ejector	Plunger type in bolt head.
Bolt-stop	Plunger type in trigger housing, engages a groove in bolt body.



Tradewinds Series 600 Action

IN 1968 TRADEWINDS, Inc., began importing a lightweight bolt-action sporting rifle they called the Tradewinds 600. The rifles (in two versions) were made by Kriegeskorte & Co., Stuttgart-Heidelberg, West Germany, makers of the well-known Krico brand rifles. The 600S has a standard single-stage trigger and open sights, while the 600K has a double-set trigger and a barrel without sights. Both have checkered walnut stocks, sling swivels, 23.62" barrels, and they were made in 222, 222 Magnum, 223, 22-250, 243 and 308. All of the 22-caliber barrels have a rifling twist of one turn in 14", the 243 has a 1:10" twist and the 308 a 1:12" twist. They weigh about 6.75 pounds.

Barreled actions were once available in the calibers listed above, the metal parts completely finished and blued, ready to be dropped into a stock. The DS model features a double-set trigger, while the S model has a standard single-stage trigger.

Actions for the 222 cartridge family were designated Model 6128; that made for the 308 family, which includes the 22-250, was the Model 6357.

The 800 Action

The 600 receiver appears to be machined from a solid steel bar or from a piece of heavy-walled seamless steel tubing. The receiver ring is larger in diameter than the rest of the receiver, which provides additional metal over the important locking lug area. The flat-faced barrel threads into the receiver ring, the threads of standard V-type, 20 threads per inch. The recoil lug is clamped between the barrel shoulder and the receiver ring. Its lug is ample in size to prevent setback of the action in the stock to prevent the lug is properly bedded. The bridge is of smaller diameter than the receiver ring. Both are round and tapped for top scope-mount bases. There is no skimping in the amount of metal left inside the receiver ring for the lock-

ing lug support shoulders. Even the bottom one, which forms the loading ramp, is so heavy that it cannot give way under heavy back thrust of the bolt.

The receiver ring is about 1.575" long, the loading port about 2.560", and the bridge about 1.175" long. The left receiver wall, not notched or cut, is amply high and thick to give sufficient rigidity to the receiver to support a free-floating barrel. The bridge area is slotted and notched for passage of the bolt handle, with the notch forming the safety lug.

The bolt body, precision machined from a single piece of steel, has heavy and unslotted dual opposed locking lugs on its extreme forward end. The approaching corners of these lugs are slightly beveled to engage and move easily over the inclined approaches on the locking lug shoulders, thus forcing the bolt forward as the bolt handle is lowered.

The bolt face is recessed for the cartridge head. The rim of this recess is cut away in one place only, and that for the very narrow extractor. The extractor, fitted into a groove cut into the bolt head, is held in place and tensioned by a spring-loaded plunger set into a hole behind it. The extractor system is not unlike that which Savage/Stevens uses in most of their 22 rimfire repeating rifles. The ejector, a plunger backed by a spring fitted into a hole in the bolt head, is held in place by a roll pin.

The bolt is open at the rear to accept the firing pin and mainspring. The firing pin is of one-piece design, but its front collar, against which the mainspring rests, is a separate part pinned in place by a tempered roll pin.

The cocking piece, fitted with a black plastic cap, is threaded over the rear end of the firing pin, and is held in place by a heavy hardened pin. Between the cocking piece and the mainspring there is a sleeve with opposing milled flats. There is a square hole milled through the rear of the bolt body to accept the bolt handle. The part of the bolt handle which

fits into the bolt is slotted to fit over the milled part of the firing-pin sleeve so that the bolt handle anchors this sleeve, and the mainspring tension on the sleeve holds the bolt handle in place.

The rear end of the bolt body is thinner than the rest of the bolt, and the cocking piece fits over this portion. Two cocking cam notches are milled in this part, with the hardened cocking piece pin so positioned as to engage these notches. On raising the bolt handle, the pin, riding evenly on these cam surfaces, causes the firing pin to be forced back. Above these deep cam surfaces are two small notches, into which the cocking-cam pin rests when the action is open; this prevents the cocking piece from being turned.

Two large gas-vent holes in the front of the bolt body will adequately vent off any powder gases which might enter inside the bolt interior through the firing-pin hole from a pierced primer. The vent holes direct the gases into the left locking-lug raceway.

Behind the bridge the walls are high enough to enclose the entire cocking piece and its plastic cap, these walls having raceways for the bolt locking lugs to pass through. The cocking piece and its plastic cap also have lugs on both sides that fill these raceways. This prevents the cocking piece from turning when the bolt is raised and lowered, and at the same time effectively blocking the raceways against the entrance of foreign material and retarding the escape of powder gases should a primer or case head fail.

The bolt handle has a very low profile, and its very slim tapered stem, bent slightly back, ends with a round grasping ball. There is a spring-loaded plunger in the base of the bolt handle, and on fully closing the bolt, the plunger falls into a shallow detent in the wall

(Above) Tradewinds Model 600 short action with double-set trigger.



Left side of the German-made Model 600 Tradewinds action, with the bolt open.

of the bridge. This prevents the bolt from falling open when the action is cocked and the safety is not engaged. There is an inclined surface on the rear of the bridge which, on raising the bolt handle, contacts the bolt handle and forces the bolt back to provide the initial extraction camming power.

The Tradewinds 600 action which I received, courtesy of Tradewinds, Inc., was fitted with the double-set trigger mechanism. This trigger mechanism is fitted to the trigger guard. The sear, rocker and combination bolt-stop are housed in a separate box attached to the bottom of the receiver by two screws. The side tang safety, pivoted to the right side of this housing, is tensioned in the On and Off positions by a flat spring which covers the entire right side of the housing. The safety thumbpiece, slightly curved and finely serrated, fits flush against the rear end of the receiver. An arm forward of the safety extends into a groove in the bolt raceway and, with the safety tipped back, the end of this arm engages a notch in the rear of the bolt body, locking the bolt. At the same time, the safety locks the sear and rocker (kick-off).

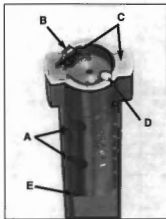
The sear, pivoting inside the housing, is tensioned by a small coil spring. The rocker pivots in the front of the housing on a lever which is, in turn, connected to the sear, pushing up on the end of the rocker, which projects below the housing, causes the sear to be pulled down to release the cocking piece or to allow the bolt to be removed, since the sear also functions as the bolt-stop. The front and rear surfaces of the sear, which projects into the boltway, are square, the rear one being the sear and the front one the bolt-stop, which

contacts the square end of a flat spot milled off the bottom of the bolt body.

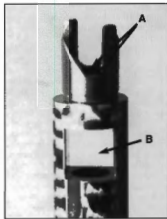
The steel trigger-guard bow itself is machined to form the housing for the double-set trigger mechanism. It is of the common two-trigger type, the triggers pivoting on separate pins running through walls milled in the trigger guard. The front trigger (by which the rifle is fired) is under tension from a small coil spring, while the rear, or cocking, trigger is powered by a heavy elongated-O flat spring. When the rear trigger is pulled back to cock the trigger mechanism it engages a sear notch in the front trigger, holding the rear trigger

back under rather heavy spring pressure. To fire the rifle, the front trigger is pulled, releasing the rear trigger, which then strikes the rocker to disengage the sear from the cocking piece. A small adjustment screw, exposed between the two triggers, adjusts the pull weight to as light as a few ounces. A hole in the bottom of the guard bow allows insertion of a screwdriver to adjust this screw. Turning this screw clockwise reduces the weight of pull.

The trigger should never be cocked until the moment just before you intend to fire the rifle, and promptly unset if for any reason the



Model 600 bolt head showing: (A) gas-vent holes, (B) extractor, (C) locking lugs, (D) ejector, (E) bolt-stop shoulder.



Rear end of the Model 600 bolt, showing: (A) twin cocking cams, (B) square hole for bolt handle.



Top view of Model 600 Tradewinds action.

rifle is not fired. With this rifle the set-trigger can be safely unset by engaging the safety and/or raising the bolt handle and pulling the front trigger. The rifle should *never* be carried with the trigger mechanism cocked, for the triggers can be cocked as easily and as quickly after sighting something to shoot at as it is to move the safety to the Off or Fire position. It is possible to fire the rifle without cocking the triggers by merely pulling back hard on the front trigger, but the pull is so heavy and rough that it would be difficult to fire the rifle accurately in this manner.

The Tradewinds 600 action with the single-stage trigger mechanism has a conventional trigger in the rear housing in place of the rocker. This trigger is only adjustable for weight of pull, and to make this adjustment the barreled action must first be removed from the stock. The adjustment screw, located at the front of the housing, has a lock nut which must be loosened before the screw can be turned. This rifle has an additional lever at the left of the bridge which depresses the rear for removal of the bolt.

The barreled action is held in the stock by three guard screws threaded into the bottom of the receiver; one through the front of the magazine plate, the others through holes in each end of the guard. Heavy steel stock bushings are provided for these screws, with the rear and center one being partially threaded inside to match the threads on the guard screws, but I have not figured out the reason or purpose of this arrangement. However, when making or fitting a stock to this action, the three bushings should be used; especially so the two rear ones, as they will provide the correct spacing between the double-set trigger mechanism and the rear/safety mechanism.

The trigger guard is of milled steel. The magazine plate, a stamped piece of heavy sheet metal, is held in place at the rear by its fitting into a groove in the guard, and at the front by the front guard screw. A sheet-metal

magazine-box housing is positioned between the trigger plate and the bottom of the receiver, which is milled out for the magazine. The magazine catch, fitted to the rear of the magazine plate, is tensioned by a small coil spring.

The simple magazine box is made of heavy sheet metal, with the seam welded where the edges come together up front. The bottom of the magazine box has rolled edges which engage over notches crimped in the magazine so that it is easily slipped off for cleaning. It is locked in place by a plate-like plunger fitted under the bottom of the follower spring. The follower spring, W-shaped, has a flat sheet-metal plate riveted on each end. The follower is a sheet-metal stamping. The edges of the rear part of the magazine-box opening are curved inward to hold the follower in place, as well as to hold the cartridges in the magazine after they have been inserted.

To load the magazine, individual cartridges are pushed down slightly into the front half of the magazine and then slid back under the magazine lips. The magazine, inserted by merely pressing it home, is removed by pushing the magazine latch forward.

Comments

I consider this action an excellent one, with many things about it that I think are very good. The things I don't like are minor, and do not really detract much from the overall quality of the action or from its performance.

I like the heavy receiver ring with its rather large barrel shank thread. I like the solid twin locking lugs and the more than ample amount of metal left in the receiver ring for the locking-lug supporting shoulders. Although this action is quite light in weight, the strength in the receiver ring and breeching more than adequately support any cartridge for which this action is chambered. Having a recessed bolt face is a good idea, and the bolt of this rifle is large enough in diameter so that the rim around the recess is thick enough to actu-

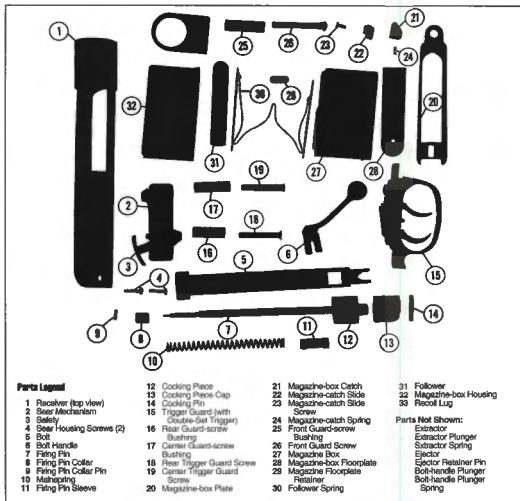
ally support the cartridge rim in the event such support is needed. The ejector is good. That the tip of the extractor does not protrude beyond the bolt face is a good idea because this makes it feasible to fit a flat-faced barrel to the action. I think the extractor will prove adequate, but I'd like to have seen it made about twice its width, like the extractor in the Sako L61 action.

Although I think this action has adequate provisions to protect the shooter from escaping powder gases against the rare occurrence of a ruptured case head or primer, drilling two small holes in the receiver ring would make it much safer. I would put one hole in the right of the receiver ring, just behind the face of the barrel, and another hole in the left side, just opposite the front gas-vent hole in the bolt. I don't believe there would be any need for the rearmost vent hole in the bolt.

The design and construction of the firing mechanism and the way it is held in the bolt by the bolt handle is very good. The size, shape and placement of the bolt handle is quite pleasing. I very much like the plunger built into the base of the bolt handle—more bolt action rifles should have this feature. The design of the twin cocking cams is excellent. I would prefer something other than plastic used to cap the cocking piece, for in time the plastic may deform or crack.

I think the safety could have been improved in several ways. First, it may be a little too noisy for some hunters, as a definite click can be heard when the safety is disengaged. I also believe some will complain that the safety slips too easily under the thumb, and even worse under a gloved thumb: coarser serrations—or better still, two serrated humps—would have taken care of this. Also, if the safety could have been made to slide back and forth instead of pivoting, the unsightly cut in the stock could have been avoided.

The good single-stage trigger mechanism should be the first choice if the rifle is to be



Dimensional Action Specifications

Weight	26 ozs.
Length	7.875"
Receiver ring diameter	1.290"
Bolt diameter	.685"
Bolt travel	3.850"
Striker travel	.360"
Bolt-face recess:	
Depth	.135"
Diameter	
(243 cal.)	.475"
(222 cal.)	.380"
Magazine length	
(243 cal.)	2.620"
(222 Mag.)	2.290"
Guard-screw spacing	6.750"

Tradewinds Model 600

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece machined steel. Separate recoil lug fits between barrel and receiver. Non-slotted bridge. Tapped for scope mounts.
Bolt	One-piece machined steel with detachable handle. Dual-opposed forward locking lugs. Base of low profile handle acts as safety lug.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Detachable single-column four-shot box type in 222, three-shot in the larger calibers.
Trigger	Single-stage, adjustable for pull weight. Optional—double-set trigger.
Safety	Pivoting side tang type looks sear and bolt when tipped back.
Extractor	Hook type in bolt head.
Ejector	Plunger type in bolt head.
Bolt-stop	Sear doubles as bolt-stop; stops bolt by contacting a shoulder on bolt bottom.

used for shooting running game or for big game hunting. Although the trigger pull must of necessity be a bit long, it can be adjusted to a light pull. For the serious varmint shooter I recommend the double-set trigger, which appears to be well made and very rugged. There is plenty of room in the guard to operate this mechanism, and I believe it will stand up under much use.

I like the 600 magazine system, which has some advantages over a non-detachable one. The loaded magazine can be quickly and easily inserted into this rifle, and as quickly removed. A spare loaded magazine can be carried for quick reloading, or a spare magazine with different loads in it may at times be convenient and desirable. If of the single-column design, as is this one, feeding problems are eliminated because cartridges are fed in a straight line into the chamber. Also, with a single-column design, less wood has to be cut out of the stock to weaken it at this point. This may be of some advantage in a varmint rifle. The only disadvantage is that the magazine is easily lost.

What I like most of all about this German-made action is that it is so well made and finished. Excellent workmanship is evident at every glance. The receiver is beautifully machined, polished and blued. The bolt is perfectly straight and round, highly polished and jeweled. There is no sign of over-polishing, the polished surfaces being perfectly level and without dished-out holes or rounded corners. Most of the other parts are equally well finished. The action operates with ease and smoothness. Lock time is very fast and ignition positive. Some will object to the stamped magazine plate but so little of it shows that it does not detract from the rifle's appearance.

Takedown and Assembly

To remove the bolt from the plain-trigger action, hold the trigger back and, while pressing down on the lever on the left side of the receiver, pull the bolt out. On the action with the DS trigger just hold the front trigger back to remove the bolt. To reinsert the bolt, the trigger must be held back or the lever depressed.

To disassemble the bolt, grasp the bolt body in one hand and the cocking piece in the

other, then pull the cocking piece back until it can be turned clockwise. Rotate it $1/4$ -turn or until it falls against the bolt. The bolt handle can then be pulled from the bolt body and the firing mechanism from the bolt. To remove the mainspring, drive out the roll pin from the collar on the front of the firing pin. Reassemble in reverse order. The firing pin is threaded tightly into the cocking piece, and they should not be separated except for replacement of either part, in which case the cocking pin must first be driven out. The plastic cap is pressed on the rear of the cocking piece; there is no need to remove it.

The ejector is removed by driving out its cross pin from the bolt head. Use a sharpened jeweler's screwdriver to remove the extractor by pushing the extractor plunger into the bolt and lifting out the extractor.

To remove the barrel and action from the stock, first remove the magazine box. Then turn out the front guard screw and lift the magazine plate up at the front and take it out of the stock. The magazine catch can then be removed by turning out its screw. Turn out the front and rear trigger-guard screws and the barreled action can be lifted from the stock. Pinch in the middle of the magazine housing slightly and remove it from the receiver. Turn out the rear and center guard screws all the way and the trigger guard can be removed from the stock. Reassemble in reverse order.

Remove the trigger/sear mechanism by turning out the two screws on the left side of the housing, and pull the housing away from the receiver. Do not disassemble this mechanism, or the double-set trigger mechanism, unless absolutely necessary, and then only if you know what it's all about, laying the parts out in the order they are removed so they can be correctly assembled again.

To disassemble the magazine box, hold the box upside down and depress the small plunger projecting through a hole in the floorplate with a pointed tool, and slide the plate forward and off the box. The plunger plate, follower spring and follower can now be removed. Reassemble in reverse order.

Markings

The Tradewinds 600 action is serial num-

bered, the number stamped on the bottom-right side of the receiver ring and on the bottom-front of the bolt body. The following, in two lines, is stamped on the lower left side wall of the receiver:

MADE IN GERMANY
TRADEWINDS MODEL 6357
(or 6128)

All markings are normally covered by the stock.

Conclusion

In about 1970 I heard from Tradewinds that another 600 series rifle had been introduced. Called the Tradewinds Husky, it came in two action lengths—the short one in 22-250, 243 and 308, its action almost identical to that used on the M600S Tradewinds rifle described earlier in this chapter. The 270 and 30-06 Husky has a longer action than the M600S, but is otherwise about identical to it. It has a magazine box long enough to accept the 270 cartridge, which is normally loaded to 3.340" overall length.

The Husky high-power rifle which Tradewinds originally sold was built on the Husqvarna action. The name "Husky" is a registered trademark owned by Tradewinds, and when Husqvarna discontinued the manufacture of firearms, Tradewinds transferred the name Husky to a rifle built in West Germany by the firm that built the Krico rifles on the action described in this chapter. This Husky has been the only high-powered rifle sold by Tradewinds during the few years prior to this edition of this book.

A further update on the M600 rifle: In the literature I received from Mandall's Shooting Supplies, Inc., in 1994, who are the importers of the Krico rifles, they list the Krico M600 as one of their products. Although I have never examined one I believe the action used is essentially the same as described. They list the following models: Krico M600 Hunting, Krico M600 Match, Krico M600 Sniper and Krico M600 Single Shot.

Another model of the Krico is the M300 described in this book. It is a rifle with a considerably changed action from the other Krico models.



I DON'T KNOW exactly when I first came across the name of Roy E. Weatherby, but it was the byline of an article he wrote for one of our popular outdoor magazines in the mid-1940s. At that time I only skimmed over the article, which was about the merits of high-velocity bullets versus slow-moving heavy bullets for hunting. A couple of months later, however, the magazine published some letters critical of Weatherby's article. After reading these I reread the article and decided to come to the author's defense. I wrote a letter to the editor voicing my support. My letter was not published, but it was forwarded to Weatherby, who promptly acknowledged it and thanked me for siding with him. I was later to learn that, with that article, he touched off a controversy that would never be resolved. While there are still many who may disagree, I would say that Weatherby won the decision. Even if he didn't win that argument, he certainly won in every other way. His belief that a light high-velocity bullet has more killing power than a heavy, slow bullet brought him world-wide recognition, respect and wealth.

It was not without a lot of work that he achieved this success. He built his first rifles in a garage, and from this modest beginning he graduated to the world's most up-to-date custom arms factory and headquartered it in South Gate, Calif. His fame derives not so much from his rifles, but from the combination of his very distinctive rifles and their being chambered for a line of magnum cartridges he designed. Ballistics, and especially high-velocity ballistics, were his main interest; that was the theme of his early articles, which appeared in several sporting magazines. He not only knew a lot about ballistics, rifles and hunting, he was also a good writer. Above all, he proved to be a genius at promoting his product—the Weatherby Magnum rifle.

Rereading Weatherby's article "Back-alley Ballistician," which appeared in the Jan., 1947, issue of *The American Rifleman*, it isn't hard to see why he was successful. This short article gives an insight into his

thinking, education, practical knowledge of ballistics and his ability. Since this book is about actions and not about gunmakers, rifles or cartridges, if you want to read more about Weatherby, I suggest you get the latest Weatherby catalog, and, if you can find one, an older copy of Weatherby's *Tomorrow's Rifles Today*.

After the publicity that resulted from his article, Weatherby began building custom-made rifles, most of them chambered for the 300 Weatherby Magnum cartridge. He used whatever good centerfire turnbolt action he could get, or used the action the customer sent in. These included the 98 Mauser, 1917 Enfield, 70 Winchester and others, including the Schultz & Larsen. Shortly after WWII, he began using the FN Mauser actions almost exclusively for the rifles bearing his name. I have read that these actions were especially made for Weatherby by FN, but having seen a number of the early Weatherby rifles built on these actions, I could find nothing "special" about them. All appeared to me to be identical to the FN Mauser actions then being imported by Firearms International, which are described in another chapter.

While FN Mauser actions are good, they were not entirely satisfactory for several of the very hot Weatherby Magnum cartridges, and especially not for the longest ones, when the magazine and magazine well had to be made longer and the action weakened in so doing. Weatherby Magnum cartridges were very powerful, and most of them were very hard on both action and barrel. Consequently, while he was developing additional magnum cartridges and experimenting with different barrel steels, he was also looking for a better action. Evidently Weatherby decided that if he was to get the action he wanted, he'd have to design it himself, and then have it manufactured. This he did, for in 1958, after having used the FN actions for about a dozen years, he introduced the all-new Weatherby Mark V turnbolt action.

Those riflemen and big game hunters who didn't know before 1958 what the name "Weatherby" meant, quickly learned what it

stood for.

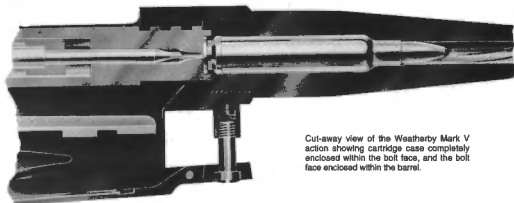
Previously, it had stood for extremely high-velocity sporting cartridges and expensive custom-made sporting rifles, but afterward it also stood for the world's newest, strongest and safest commercial, sporting, turnbolt rifle action. Today, of course, the Mark V is no longer the "newest" action, nor is it any stronger and safer than some others now being made, but in 1958, and for a few years afterward, it was exactly that. At that time there was no other turnbolt action quite like it, nor had there been anything made before that was like it. It was designed and built to be the strongest, smoothest and best-looking rifle possible.

Since then a lot has been written about the Weatherby Mark V rifle and action. Even as expert hunters and riflemen disagree sharply on the merits of the Weatherby rifles and the Mark V action, I do not want to get myself involved in this dispute, so I'll describe the action as I see it.

The Mark V Action

The Mark V receiver is made from a one-piece chrome-moly steel forging. After inspection the forging is machined to final dimensions. This probably includes milling, shaping, boring and turning before it is finished. The center of the receiver is bored to accept the bolt. The front of the receiver is threaded to take the large barrel shank, its thread diameter 1.160". The receiver ring is round on top and flat on the bottom. The recoil lug, made as an integral part of the receiver, is positioned just to the rear of the front edge of the receiver. The bottom of the recoil lug, and the flat portion to the rear of it, are the only flat areas on the bottom of the receiver. This seems, however, to be enough area for the receiver to bottom in the stock, and is enough to prevent stock splitting from a tightly-turned front guard screw. The rest of the receiver is round. The top of the bridge has a

(Above) Right side view of the Weatherby Mark V rifle.



Cut-away view of the Weatherby Mark V action showing cartridge case completely enclosed within the bolt face, and the bolt face enclosed within the barrel.

different radius and is lower than the ring. The loading/ejection port cut out leaves one wall much higher than the other, depending on whether the action is a right- or left-hand type. Since the Mark V bolt does not have the usual projecting Mauser-type locking lugs, no locking lug raceways are required in the receiver wall. This leaves the high receiver wall very thick, adding to the rigidity of the action.

The Mark V bolt, also of one-piece construction, is made from chrome-moly steel. The large-diameter bolt (.840") has the bolt handle on its extreme rear end. The latter is an integral part of the bolt. The base of the bolt handle is quite heavy, but its stem is tapered and slightly sloped back, joining the round and checkered grasping ball. The bolt handle's very low profile will clear the lowest-mounted scope. Initial extraction camming power is obtained on the up-lift, of the bolt handle; a sloped surface on the base of the bolt handle moves over a matching surface on the rear of the bridge.

The locking lugs are on the front of the bolt. There are nine in all, a triple set of three to a row. The lugs are formed by reducing the end of the bolt to a smaller diameter, leaving the lugs .360" high. Six of the lugs are .325" long, the other three about .230". The interior of the ring, at the rear, has milled-out shoulders for each lug. The ring is not weakened by this milling since the bolt lugs do not project beyond the outside diameter of the bolt body, thus the receiver walls are left thick and solid. The approaching corners of two rows of the lugs are angled off so that, on the down stroke of the bolt handle, the bolt is cammed forward a short distance before it becomes locked in the receiver. There is also a notch in the receiver tang for the bolt handle, which can serve as the safety lug.

The bolt face is counterbored for the cartridge head. The breech end, or face, of the

barrel is also counterbored for the head of the bolt—that portion of the bolt head, forward of the first circle of locking lugs, which forms the rim for the cartridge head recess. This rim around the bolt face recess supports the bolt head to fully enclose and effectively seal the cartridge in the chamber.

The Mark V extractor, a small pivoting hook fitting into a groove cut into the bolt head, is held in place by a small cross pin on which it pivots. It is tensioned by a small coil spring located in a hole under the rear end of the extractor. The front end of the beveled extractor hook, flush with the rim on the bolt head, has enough bevel so that it snaps easily over a cartridge rim when the bolt is closed. The ejector is a plunger, powered by a coil spring, fitted into a hole in the bolt head face. It is held in place by a small cross pin through the bolt head.

There are eight evenly spaced shallow grooves, about 1/4" wide, milled lengthwise on the bolt body. Evidently the chief purpose of these grooves is to reduce friction between the bolt and receiver. Three 1/4" gas vent holes are drilled along the bolt body, so located that when the action is closed and locked the holes are exposed in the ejection port.

The bolt is drilled from the rear to accept the firing mechanism. This mechanism consists of a one-piece firing pin threaded into the cocking piece, a cocking piece which fits inside the bolt sleeve, a bolt sleeve threaded into the bolt, a coil mainspring which fits over the firing pin and is compressed between the bolt-sleeve stem and the collar on the front of the firing pin, and a ball bearing, which is fitted into a hole in the bolt-sleeve stem to keep the firing pin from turning.

The one-piece bolt sleeve is entirely closed at the rear. Its top and sides, gently contoured and tapered to the rear, form a very pleasing outline. Only its bottom is open to accept the cocking piece. The cocking piece has a tail

extension (as on the post-1964 Model 70 Winchester) which projects back and below the rear end of the bolt sleeve when the action is cocked, providing a cocking indicator. The nose of the cocking piece fits into a cam notch cut into the rear of the bolt, so that on the up-lift of the bolt handle, and the attached firing pin (together they are called the striker) are cocked. On complete lift-up of the bolt handle, the nose of the cocking piece rests in a shallow notch. This prevents the bolt sleeve from being easily turned when the bolt is open.

Proper firing pin tip protrusion is obtained by turning the firing pin the correct amount in the cocking piece. This adjustment is maintained by a ball bearing fitted into a hole in the threaded stem of the bolt sleeve. Part of the rear end of the firing pin stem is milled flat where it contacts the ball bearing; with the ball bearing held down when the bolt sleeve is in place, the firing pin cannot turn.

The safety, built into the side of the bolt sleeve, is a rotary type with a short, serrated lever for its operation. The stem of the safety extends into the bolt sleeve to engage the cocking piece when the safety is tipped back. In a slot cut into the bolt sleeve, in front of the safety, a flat piece of metal serves as the bolt lock. Pivoted on a screw threaded into the bolt sleeve, it is tensioned by a small flat spring attached to it. This spring also serves to hold the safety in place and tension it. When the safety is tipped back it cams the striker back a slight amount and looks it there; at the same time it tips the bolt lock so that the bolt is also locked. When the safety is tipped up and forward a red-colored dot is exposed on the bolt sleeve, indicating that the rifle can be fired.

The trigger mechanism, as well as the bolt-stop, is carried in an aluminum and sheet metal housing, the whole attached to the underside of the receiver by a pin and held tight by a set-screw in the front of the housing. The sear, the front end of which projects into the cocking

cam raceway in the receiver, is pivoted on a pin running through the housing, and is tensioned by a small wire spring. Directly underneath it is the trigger, also pivoting on a pin through the housing. Threaded into the front of the housing is the trigger weight-of-pull adjustment screw, with the trigger coil spring positioned between this screw and the trigger. Threaded into the rear of the housing, behind the trigger, is the trigger take-up or sear engagement adjustment screw.

The bolt-stop, a round plunger, fits vertically into a hole in the front part of the trigger housing, its upper end projecting through a hole in the bottom of the receiver. Here its end, projecting into a groove cut into the bolt body, acts to stop the bolt when the end of the groove contacts the bolt-stop, to guide and prevent the bolt from turning as the bolt is operated. A similar bolt-stop arrangement is also used in the Texas Magnum, Chaplain and Remington 788 actions as described in other chapters in this book. In the Mark V action, the bolt-stop is linked to the trigger by an L-shaped piece of metal; by pulling the trigger back, which pulls the bolt-stop plunger down, the bolt can be removed from the receiver. This arrangement makes bolt removal convenient, but it prevented the installation of a trigger stop adjustment screw, which many riflemen consider desirable.

The separate sheet-metal magazine box is folded to form and welded at one end. Its top fits into the magazine well opening in the receiver bottom. The sides of the well are milled to leave cartridge guide ribs in the receiver, but bent lips on the top front part of the magazine box also provide additional guides for cartridges fed into the chamber by the bolt.

The barrel and action are securely held in the stock by two guard screws passing through the ends of the guard, these threading into the recoil lug and receiver tang. The magazine box is also held in place by the steel guard, which is not a stamping. The steel floorplate, hinged to the front of the guard, is held closed or released by a simple catch fitted into a slot in the front of the guard bow. The follower has a ridge on one side to stagger the cartridges in the magazine. The ends of the W-shaped follower spring fit into mortises in the floorplate and follower, holding these three parts together.

Except for the trigger housing, the Weatherby Mark V action is made entirely of steel. All main working parts of the action are extremely well made, fitted and finished. The bolt fits closely in the receiver, the contacting surfaces between the bolt and receiver level and smooth and the outside of the bolt is highly polished. The bolt and the receiver are heat-treated for maximum strength, as are various other parts, and hardened as required. All out-

side surfaces are highly polished and blued, except for the bright bolt body and the top of the receiver ring, bridge and bolt sleeve. These are sandblasted before bluing.

Markings

The serial number is stamped on one side of the receiver ring. Stamped on the other side of the receiver ring is:

MARK V
U.S. PATENT 3,013,355

The name WEATHERBY, and the letter R within a circle, (name registration mark), are stamped on the receiver wall in bold script.

Takedown and Assembly

Check to see that chamber and magazine are empty. To disassemble the Weatherby Mark V rifle proceed as follows: with the safety in the Fire position, open the bolt and, while pulling back on the trigger as far as it will go, remove bolt from the receiver. To disassemble the bolt, grasp the bolt body in the left hand with the bottom side of the bolt sleeve up; with a tool (a screwdriver will do) in the right hand, firmly pull the cocking piece back and slip the notch on the side of the cocking piece over the matching notch or shelf on the bolt sleeve. Now grasp the bolt sleeve, bottom side up, and unscrew the bolt body from it—rather than unscrewing the bolt sleeve from the bolt. When unscrewing the bolt from the sleeve, note the ball bearing, located in a slot in the threaded shank of the bolt sleeve; as soon as it is entirely visible, pick the bearing out with tweezers or tap it out. Then unscrew the bolt fully from the bolt sleeve. With a screwdriver, release the cocking piece from the shelf and

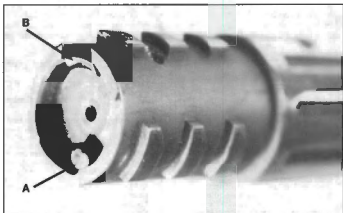
allow it to move forward. Grasping the bolt sleeve firmly, and using a Crescent wrench on the forward shoulder on the firing pin, unscrew the firing pin slowly from the cocking piece, being careful not to allow the spring to jump out when the firing pin is fully unscrewed. With the firing pin removed, take the cocking piece from the bolt sleeve. To remove the safety, unscrew the small bolt-sleeve lock screw from the side of the bolt sleeve, remove the bolt-sleeve lock and spring, and pull out the safety.

To remove the extractor and ejector, drive out the two small pins in the bolt head that hold these parts in place. The small pins are snugly fitted so a good cylindrical drift punch is needed. With the pins removed, or three-quarters so, the extractor and ejector, also with their springs, can be removed. Reassemble all parts in reverse order.

In assembling the firing pin and firing pin retainer ball bearing, make sure the flat side of the firing pin coincides with the hole for the ball bearing. Assemble the bolt sleeve in the bolt, then check firing pin protrusion after lowering the cocking piece. Normal protrusion from the bolt face is about .055" to .060". If the protrusion is noticeably less or more than this, then the firing pin must be turned in or out of the cocking piece as required.

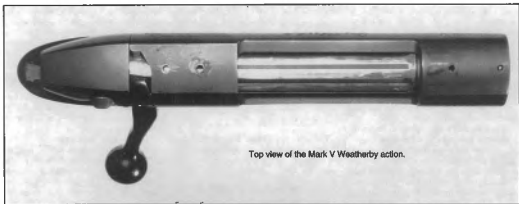
To remove the barrel and receiver, turn out the two guard screws, using a proper fitting screwdriver, then lift out barrel and receiver. Push and pull the guard and magazine from the stock. Drive out the hollow pins from the guard to remove the floorplate from floorplate latch.

To remove the trigger mechanism, loosen the set-screw in the extreme front of the trigger housing. Using a proper-sized drift, drive



Weatherby Mark V bolt head showing: (A) ejector, (B) extractor, and two of the three rows of locking lugs (total of nine lugs).

PART II: Commercial Rifles & Actions



Top view of the Mark V Weatherby action.

out the pin holding the trigger mechanism to the receiver and remove the trigger unit. Reassemble in reverse order.

It is not advisable to completely disassemble the trigger mechanism, unless absolutely necessary. However, this can be done if great caution is taken.

Trigger Adjustment

The Mark V trigger has only two adjustments, weight of pull and take-up. The pull weight adjustment screw is located in the front of the lower part of the trigger housing; turned clockwise the pull weight is increased, and vice versa. The take-up adjustment screw is located at the rear part of the housing; turning it clockwise decreases sear engagement. This adjustment is normally correctly set at the factory, and it should not be tampered with. If such adjustments are made, the rifle should always be tested to make sure the striker will not fall when the bolt is closed smartly. To do this, slam the bolt closed several times; if the sear fails to stay cocked at any time, either one or both of the adjustments are too light.

There is no over-travel (trigger stop) adjustment.

Comments

I don't believe I am prejudiced for or against any particular centerfire turnbolt rifle or action, but being quite conservative I must admit that Weatherby rifles have never appealed to me. I don't like the Weatherby stock, since I dislike white spacers, inlays, slanted forend tips, flared pistol grips and skip-line checkering. Put a conservative, classic walnut stock on the Weatherby barreled action and I'd like to have the rifle in my gun cabinet. On the other hand, I very much like the Mark V action, and this is the part of the rifle we're interested in.

The Mark V action is large, long, and heavy, but it is so streamlined that it does not appear to be so. The Mark V action is strong. Some other actions are just as strong, like the Texas Magnum and Champlin, but I doubt if any are stronger. The nine locking lugs offer a lot of locking contact and shear area. Since the receiver ring is not weakened by any deep

locking lug raceway cuts, there is little chance that the receiver will ever fail. According to Weatherby's 1962 catalog, the Mark V receiver and bolt are made of SAE 4340 chromemoly steel. The receiver is hardened to 40-43 Rockwell C, while the bolt is hardened to 50-55 on the same scale. The Weatherby shop proved the strength of the Mark V by subjecting it to numerous torture tests, firing heavy overloads that would have wrecked most other actions.

The Mark V action is also very safe. The shooter firing it can feel safe behind it, and no matter how badly the case head may rupture, or the primer leak gas into and around the bolt, there is no chance that any of the gases will strike the shooter. Whatever may happen when the rifle is fired with an accidental overload, or with an obstruction in the bore, the cartridge head—limited by the rim of the bolt-face recess—can only expand a very little bit. The only weak point in this rim is the cut for the extractor, but even here expansion is limited because the rim around the barrel-face counterbore will limit how much the extrac-

Dimensional Action Specifications

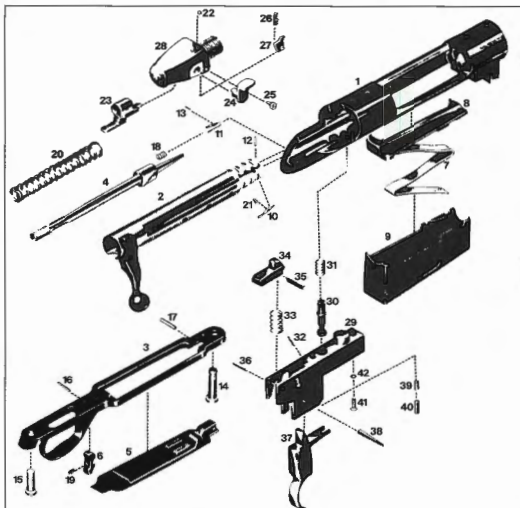
Weight (approx.)	36 oz.
Length	6.00"
Receiver diameter	1.342"
Bolt diameter	.840"
Bolt travel	4.50"
Striker travel	.335"
Magazine length	3.750"
Guard screw spacing	8.125"

Note: The specifications given are for the Mark V Magnum action made for the standard Weatherby Magnum cartridges. The Mark V Varmintmaster action is a scaled-down version of this action, and the specifications for it are in the text under the heading of Mark V Varmintmaster action.

Weatherby Mark V Rifle

General Specifications

Type	Turnbolt repeater.
Receiver	One-piece machined steel forging with non-slotted bridge and integral recoil lug. Tapped for top scope mounts.
Bolt	One-piece machined steel forging with nine (triple set of three lugs in a row) forward locking lugs. Low-profile bolt handle.
Ignition	One-piece firing pin powered by coil mainspring. Cocks on opening.
Magazine	Non-detachable staggered-column box type with hinged floorplate. Two-shot capacity for 378 & 450 WM calibers, three-shot for the other WM calibers.
Trigger	Single stage, adjustable for weight of pull and take-up.
Safety	Rotary type built into the bolt sleeve, locks striker and bolt when tipped back.
Extractor	Pivoting hook type in bolt head.
Ejector	Plunger type in bolt head.
Bolt-stop	Plunger type, fitted into the trigger housing and bottom of receiver, engages groove in the bottom of the bolt. Bolt is released by pulling trigger.

**Parts Legend**

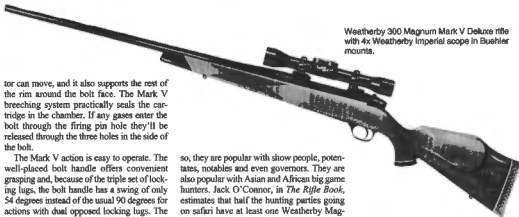
- 1 Receiver
- 2 Bolt Body
- 3 Trigger Guard
- 4 Firing Pin
- 5 Floorplate
- 6 Floorplate Catch
- 7 Follower Spring
- 8 Magazine Box
- 9 Magazine
- 10 Extractor
- 11 Ejector
- 12 Extractor Pin
- 13 Ejector Pin
- 14 Front Trigger Guard Screw
- 15 Rear Trigger Guard Screw
- 16 Floorplate Catch Pin

- 17 Floorplate Pin
- 18 Ejector Spring
- 19 Floorplate Catch Spring
- 20 Firing Pin Spring
- 21 Extractor Spring
- 22 Retainer Ball
- 23 Cocking Piece
- 24 Safety Lever
- 25 Safety Hook Screw
- 26 Safety Spring
- 27 Safety Hook
- 28 Bolt Sleeve
- 29 Trigger Housing
- 30 Bolt Stop
- 31 Bolt Stop Spring
- 32 Creep Adjustment Screw
- 33 Sear Spring
- 34 Sear

- 35 Sear Lock Pin
- 36 Sear Pin
- 37 Trigger
- 38 Trigger Pin
- 39 Trigger Spring
- 40 Pull Weight Adjustment Screw
- 41 Trigger Housing Attachment Screw, Bottom
- 42 Sear Washer, Bottom Attachment Screw

Parts Not Shown

- Barrel
- Sear Spring Washer
- Stock
- Trigger Housing Attachment Screw, Top



Weatherby 300 Magnum Mark V Deluxe rifle with 4x Weatherby Imperial scope in Buehler mounts.

tor can move, and it also supports the rest of the rim around the bolt face. The Mark V breeching system practically seals the cartridge in the chamber. If any gases enter the bolt through the firing pin hole they'll be released through the three holes in the side of the bolt.

The Mark V action is easy to operate. The well-placed bolt handle offers convenient grasping and, because of the triple set of locking lugs, the bolt handle has a swing of only 54 degrees instead of the usual 90 degrees for actions with dual opposed locking lugs. The bolt fits very precisely in the receiver and, as long as the outside of the bolt and the inside of the receiver are kept clean, bolt operation is smooth and easy. If oil and dirt are allowed to accumulate on these surfaces, bolt operation can become sluggish.

When I first examined a Mark V action I was a bit skeptical about the bolt-stop. I thought it too small, and I had the idea I could shear it off by opening the bolt very smartly a few times. I tried that a couple of times, but the bolt-stop must be made of good stuff—it wouldn't shear. However, while the round-peg bolt-stop may be adequate, I think it would be better if it were flat, say $\frac{1}{16}$ " wide by $\frac{1}{16}$ " long.

About the only thing I don't like about the Mark V action is the tiny safety button. This streamlining business is ok, but it should not include making a safety so small it cannot be easily and conveniently operated under all conditions.

Notes

Weatherby rifles and cartridges are popular the world over. They are expensive and for this reason they are most popular with the wealthy. Because the rifles are very showy, and the Weatherby shop can really make them

so, they are popular with show people, politicians, notables and even governors. They are also popular with Asian and African big game hunters. Jack O'Connor, in *The Rifle Book*, estimates that half the hunting parties going on safari have at least one Weatherby Magnum rifle in their arsenal.

Separate Mark V actions are not available.

Weatherby does not manufacture Mark V actions. Prior to 1969 the Weatherby actions were made by J.P. Sauer and Son in Germany. From 1969 to 1995 Weatherby Mark V actions were made in Japan by Howa Machinery Co., Ltd., Nagoya, Japan. The same firm also made the Weatherby Vanguard described in another chapter. Beginning in mid-1995, the rifles are being made in the U.S. by Saco Defense, Inc. of Saco, Maine.

Mark V Varmintmaster

The standard Mark V action is unnecessarily large for any cartridge much smaller than 30-06. Even the smallest of the Weatherby Magnum cartridges, such as the 257 WM (it was the smallest Weatherby caliber in 1964) was just too powerful for the average varmint hunter. Weatherby once offered a 22 center-fire cartridge called the 220 Rocket, which was merely an "improved" 220 Swift. It was not very popular and has dropped by the wayside. A later 22-caliber Weatherby development was the 224 Weatherby Magnum, a cartridge based on a miniature Weatherby belted magnum case. Except for the head it is similar in size to the 225 Winchester case.

Weatherby introduced the 224 WM cartridge in a new rifle in 1964, calling it the Weatherby Mark V 224 Varmintmaster.

A scaled-down version of the standard Mark V action, it was only made with a right-hand bolt. Except for size, weight and number of locking lugs, both actions were nearly identical. To give some indication of the differences, here are some specifications for the Varmintmaster action:

Weight	32 oz.
Length	7.50"
Bolt travel	3.25"
Receiver diameter	1.100"
Bolt diameter .....	.709"

Instead of having nine locking lugs, the Varmintmaster has only six; two in each row of three. Since the 224 WM and the 22-250 don't develop as high breech pressures and back-thrust as the larger Weatherby Magnum cartridges, the six locking lugs are more than ample to securely lock the bolt within the receiver.

In 1968, Weatherby began chambering the Varmintmaster rifle for the very popular 22-250 cartridge as well.



THE WEATHERBY FIRM, known as the source of some of the most powerful rifles and cartridges in the world, branched out in about 1970 to include a less powerful and less costly bolt-action rifle in their product line. That rifle was the Vanguard.

I used the verb "was" because I do not find the Vanguard listed in their 1994 catalog. I have it on good authority that Weatherby has dropped the Vanguard. You should be aware that the rifle may have gone through one or more minor changes since 1970, but I will limit this discussion to the one I have.

As marked plainly on the rifle, my Vanguard was made in Japan by Howa, the same company that made the Weatherby Mark V. While there was more than one Vanguard rifle model, I chose to purchase the latest one with the composition stock, which is the Vanguard Weatherguard. Weatherby last listed this rifle as being made in 223 Rem., 243, 308, 270, 7mm-08, 7mm Rem. Mag., and 30-06, on two action lengths. My rifle is chambered for the 223, has a 24" lightweight sporter barrel and weighs 7.5 pounds. The metal parts have a silvery matte rust-proof finish.

The stock on my Weatherby Vanguard Weatherguard rifle is distinctive. It is made of a moulded composite of fiberglass and graphite and has a matte black finish. The checkering on the grip and forearm is in relief, or higher than the rest of the stock, and the diamonds are clean and sharp. It has a cheekpiece, rubber butt pad and is fitted with sling swivel studs. It is a well-shaped sporter stock in a style I like. By no means a good-looking stock, at least in my opinion, it does feel good in handling and shooting the rifle.

The Vanguard Action

The Vanguard action has a one-piece

steel receiver which probably started as an investment casting of a chrome-moly steel. It is machined inside and out to final dimensions. The front of the receiver is threaded to accept the barrel shank. The breech face of the barrel is flat, and recessed to accept the front end of the bolt much as in the Remington M721 to 700 series. Raceways are machined in the receiver for the two locking lugs on the bolt. More machining is done elsewhere inside the receiver for the cocking cam raceway, bolt-stop, locking lug shoulders, and on the outside to form the tang and bolt handle notch. Holes are also drilled and tapped for scope mount bases. This action uses the same mount bases as made for the Weatherby Mark V. Below the receiver ring there is a large recoil shoulder, and behind it the receiver is flat.

The bolt-stop is not unlike the one used in the Winchester Model 70. It is a lever tensioned by a spring and held in place by a screw in a groove machined through the left sidewall. It stops the bolt when the tip of it projects into the left locking lug raceway to contact the locking lug.

The Vanguard bolt has dual opposed forward, unslotted, locking lugs like those on the M700 Remington bolt. The face of the bolt is recessed for the cartridge head. In the left side of this recess a spring-backed plunger is positioned to serve as the cartridge ejector. A slender claw extractor is fitted in a groove on the right side of this recess just above the edge of the right (lower) locking lug. Both the ejector and extractor are held in place by small pins. Neither of these two parts projects beyond the front of the bolt face.

There is a ring of steel around the very rear end of the Vanguard bolt to provide extra metal and a wear-free surface for the cocking cam notch. The bolt handle is part of this ring, and its base fits into a notch in

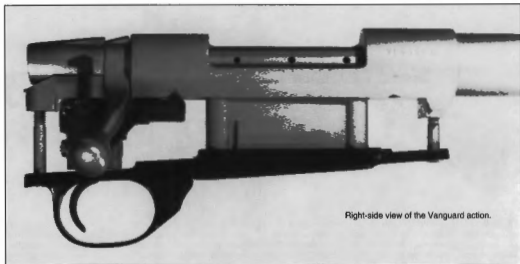
the receiver to serve as the safety lug. The bolt handle knob has a ring of checkering around it, but it is so poorly done that it would have been better to have left it off. Here, an angled surface at the upper end of the bolt handle, and a matching surface at the rear of the receiver bridge, serve as camming surfaces to aid extraction on the opening of the bolt. This ring also serves effectively to close off the joint between bolt and receiver. There are four gas escape holes in the bolt: three evenly spaced ones near the center of the bolt allow gases to escape to the right, should gases ever enter the bolt; and one larger one near the head of the bolt allows gases to escape downward. There is also a gas vent hole in the left of the receiver ring.

Six shallow grooves are machined lengthwise into the bolt body to reduce drag in the operation of the bolt.

This action has a bolt anti-bind feature, as used on a number of modern turnbolt actions such as Savage, Winchester, Remington and others. This is a feature in which the right rail or sidewall of the receiver is made with a rib that extends from inside of the receiver ring to the rear of the receiver bridge. The right locking lug is made with a groove through it to slide over this rail as the bolt runs back and forth. This anti-bind method seems to do what it is supposed to do to reduce the tendency of the bolt to bind.

The firing mechanism used in the Vanguard is a rather complicated one made up of seven parts. They are: firing pin (striker), coil mainspring, bolt sleeve, cocking piece,

(Above) The Weatherby Vanguard Weatherguard rifle.



Right-side view of the Vanguard action.

cocking pin, bolt shroud (sometimes called the bolt sleeve body) and set-screw. It is an assembly *not* to be casually messed with. My stern advice is that this firing mechanism should not be taken apart unless there is a dire need to do so, such as a broken firing pin. Removing this assembly from the bolt and replacing it is no problem, but to disassemble and reassemble these parts certainly is.

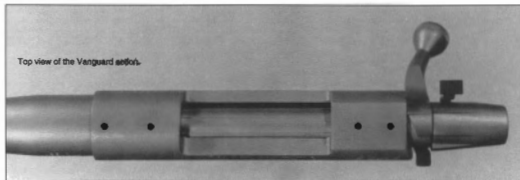
The one-piece firing pin has a collar at its front end to hold the very stiff mainspring, which slips over it. The mainspring is then compressed between this collar and the bolt sleeve, which is in turn backed and held in place by the cocking piece fitted to the rear of the firing pin. The cocking piece is secured to the firing pin, and prevented from turning, by a cross pin at the lower part of the cocking piece. This cocking

piece-to-firing pin joining is a common manufacturing method used on a number of modern bolt-action rifles. A thin lip on the cocking piece extending to the rear is the cocking indicator, and when the action is closed and cocked, the end of this lip can be seen and felt extending from the bottom rear of the shroud.

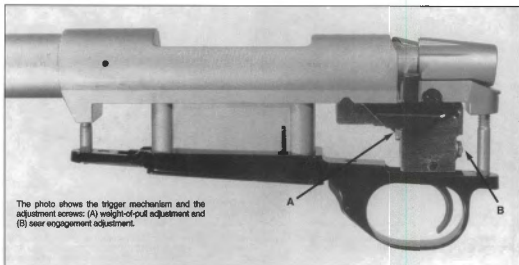
Now comes the more complicated part, the bolt sleeve. It has two functions. First, it holds the firing assembly in the bolt. The front part of this sleeve, which fits into the rear of the bolt, has a lug on its forward end to engage in front of a collar machined inside the rear of the bolt. A passageway is machined into this hollow to allow the bolt sleeve to enter the bolt and lock in front of this support. This is also a rather common manufacturing method, as opposed to having threads to do the job. The Vanguard

bolt sleeve is enlarged at its rear end, and this outside area is threaded. To cover the cocking piece, the bolt sleeve thread into it about four turns until the threads are flush with the shroud, and the half-round notch on the threads lines up with the bottom of the cocking piece. Lastly, there is the tiny set-screw in the forward bottom right side of the shroud to lock the bolt sleeve and prevent it from turning. Many modern bolt-action rifles have enclosed or covered cocking pieces. Most often they are an integral part of the bolt sleeve, and these are usually simple as compared to the one I have just described.

There is also a hole through the right side of the shroud into which, if the cocking piece is pulled or pushed rearward far enough, a close-fitting pin can be inserted to intersect a notch in the cocking piece and



Top view of the Vanguard action.



The photo shows the trigger mechanism and the adjustment screws: (A) weight-of-pull adjustment and (B) sear engagement adjustment.

hold the cocking piece back. Held back this way, the firing mechanism is then quite easy to remove. To do this, turn the shroud counterclockwise about 90 degrees until it can slip out.

The trigger mechanism, composed of the trigger, sear, pins, springs and set-screws, is housed in an aluminum box which in turn is attached to the bottom of the receiver by a single Phillips-head screw. Two trigger adjustments are provided. One at the bottom rear of the trigger housing controls the sear engagement. The second one, in the corner in front of the housing, controls the

weight of pull. My trigger, as adjusted by the factory, needed no further adjustment, and my advice to owners of this rifle is to not tamper with it.

The safety is mounted on the right side of the trigger mechanism. Its serrated end projects above the stock line at the side of the tang. Swung back, the safety locks the trigger and the bolt.

The trigger guard plate on my Vanguard rifle is made of an aluminum alloy and anodized a blue-black, while the floorplate is made of highly polished and blued steel. I find that the floorplate catch is one of the

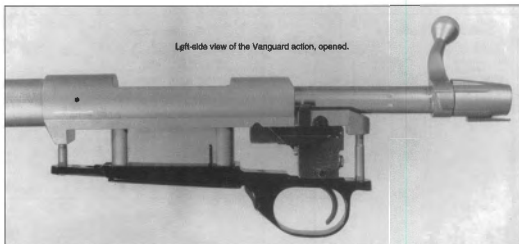
best designs of all the rifles in my cabinet, and easier to use and handier than the catch on an M70 Winchester. It is much less bulky and less conspicuous than the catch on the Mark X Mousers.

Markings

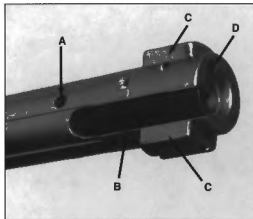
On the left side of the receiver:

**VANGUARD
MADE IN JAPAN**

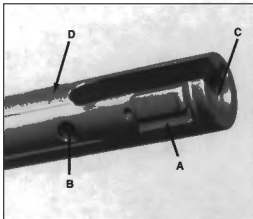
The caliber marking is on the left side of the barrel breech. On the left side of the receiver bridge:



Left-side view of the Vanguard action, opened.



Angled view of the Weatherby bolt showing: (A) one of the three gas vent holes, (B) extractor, (C) locking lugs and (D) ejector.



Another view of the Vanguard bolt showing the groove (A) in the right locking lug in the bolt anti-bind system, (B) the large gas vent hole below the bolt, (C) the bolt-face recess and (D) longitudinal grooves in the bolt body.

BY WEATHERBY (IN SCRIPT) SOUTH GATE, CALIFORNIA

The serial number, preceded by the letters VL, is stamped on the right side of the receiver ring:

VL46973

Comments

As I mentioned before, I am not excited about a non-wood stock. I would much prefer that my rifle had a well-made walnut stock. I probably would think different if I were going on an expensive big game hunt

in the mountains or far north. But I certainly do like the rest of the rifle, and especially so the action. However, I think that whoever designed the bolt shroud on this action seemed to have done their dead level best to complicate matters in the way it is fitted. Surely it could have been simpler. Of course, in the lifetime of this rifle it may never be necessary to disassemble the firing mechanism, so it does not matter too much that it is not easily taken apart. This unit is well enough made to last a number of lifetimes.

There is not much about this action to criticize. I can live with it just as the rifle

came out of the box. I like the recessed barrel breech, the bolt-stop, the anti-bind feature, safety and the floorplate latch. The recoil shoulder or lug at the bottom of the receiver ring is unnecessarily heavy—it could have been much lighter and be just as good. I do not mind the matte finish on the barrel and receiver. All in all, I like this Vanguard action.

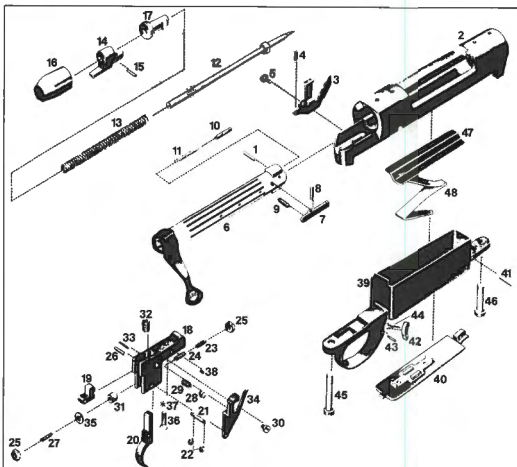
For a history of the Vanguard rifle before Weatherby put their name on it, you should read the pertinent chapters.

Dimensional Action Specifications

Receiver length	7.875"
Receiver ring diameter	1.340"
Bolt diameter	.675"
Bolt travel (223)	3.450"
Striker travel	.380"
Guard screw spacing	7.250"

General Specifications

Type	Turnbolt repeater, action operated by bolt handle.
Receiver	All steel one-piece construction, integral recoil lug, flat bottom, drilled and tapped for scope mount bases.
Bolt	One-piece construction, dual opposed front locking lugs, root of bolt handle serves as safety lug, bolt body grooved, low-profile bolt handle.
Ignition	One-piece firing pin (striker), coil mainspring, cocks on up-lift of bolt handle.
Magazine	Non-detachable stagger-column box magazine, hinged floorplate.
Trigger	Single-stage in separate housing, adjustable for weight of pull and sear engagement.
Safety	Located at side of tang, locks bolt and trigger. Built into trigger mechanism.
Extractor	Spring-backed hook fitted in bolt head.
Bolt-stop	Pivoting, mounted in rear left of receiver, stops bolt on contact with left locking lug.
Ejector	Spring-backed plunger in bolt head.
Take down	None provided, barrel threaded tightly to receiver.



Parts Legend

- | | | |
|-----------------------------|--|-------------------------------------|
| 1 Ejector Pin | 17 Bolt Sleeve Shank | 34 Safety-Lever |
| 2 Receiver | 18 Trigger Housing | 35 Creep Screw Washer |
| 3 Bolt-stop | 19 Sear | 36 Trigger Housing Attachment Screw |
| 4 Bolt-stop Spring | 20 Trigger | 37 Housing Screw Star Washer |
| 5 Bolt-stop Screw | 21 Trigger Pin | 38 Housing Screw Set Screw |
| 6 Bolt Body | 22 Retaining Rings | 39 Trigger Guard/Magazine |
| 7 Extractor | 23 Trigger Adjusting Screw - Full Weight | 40 Floorplate |
| 8 Extractor Pin | 24 Trigger Spring | 41 Floorplate Pin |
| 9 Extractor Spring | 25 Lock Nuts | 42 Floorplate Catch |
| 10 Ejector | 26 Sear Pin | 43 Floorplate Catch Pin |
| 11 Ejector Spring | 27 Trigger Adjusting Screw, Creep | 44 Floorplate Catch Spring |
| 12 Firing Pin | 28 Safety Plunger | 45 Trigger Guard Screw, Rear |
| 13 Firing Pin Spring | 29 Safety Spring | 46 Trigger Guard Screw, Front |
| 14 Cooling Piece | 30 Safety-Lever Screw | 47 Magazine Follower |
| 15 Firing Pin Retaining Pin | 31 Creep Screw Block | 48 Follower Spring |
| 16 Bolt Sleeve Body | 32 Sear Spring | |
| | 33 Sear Stopper Pin | |



Winchester Model 43 Rifle

WHEN THE LITTLE 22 Hornet cartridge was introduced in the early 1930s, it did not take Winchester long before they had a rifle chambered for it. The rifle was their Model 54 bolt action, and its action was the same size and length as that of the same rifle made for the 30-06 cartridge. It took a lot of engineering and special tooling to make that large action function reliably for the 22 Hornet, but the Winchester people did it. The little Hornet cartridge was out of place in that big action. When the Model 70 replaced the M54 in 1937, it was also offered in the Hornet caliber, but the Hornet was no more compatible with the M70 action than it had been with the M54.

Anyway, with the introduction of the 22 Hornet, Winchester had a small family of centerfire cartridges for which they had no bolt-action rifle compatible to their small size. The cartridges were the 22 Hornet, 218 Bee, 25-20 and the very old 32-20. To fill this gap, the designers came up with the Model 43, sized, constructed and priced to match these four cartridges. It was introduced in 1949 after nearly five years of development.

The Model 43 Winchester rifle is a turnbolt repeater with a detachable box magazine which holds three cartridges. It weighs about six pounds. It has a man-sized walnut stock that is fitted with non-detachable sling swivels and a checkered steel buttplate. The 24" tapered round barrel has an integral front sight ramp base for a head sight, and a dovetail slot for the elevation-adjustable open rear sight. The first M43 rifles were not drilled and tapped for scope mounts, but the later ones were.

Two models of the M43 were made. There was the Model 43 Standard sporter as described above, and the Model 43 Special sporter. The Special model featured better quality walnut than used for the Standard model with better finish, checkered pistol grip

and forend, pistol grip cap with the Winchester name on it, and was normally fitted with a Lyman No. 57A receiver sight and a rear sight blank. In 1950 the Standard model retailed at \$54.95.

The author of the book *The History of Winchester Firearms, 1866-1966*, suggests that the Winchester designers were ordered to design the M43 as a junior version of the Model 70 rifle. Depending on how one views the M43, or on which part of the rifles he compares each by, in one respect the M43 is a "Junior" M70 and in other respects it is not that at all. In my view, the M43 is a very far cry from the M70. About the only thing it has in common is that it is a bolt-action repeater with a one-piece stock and round tapered barrel. The actions are as unlike as it is possible to make them. Actually, the M43 action is nothing more than a beefed-up version of the Model 69A 22 rimfire action. To point this out let's take a close look at the M43 action.

The M43 Action

The receiver is about 6" long and appears to have been machined from a solid round bar of alloy steel. It is bored and reamed clear through and its front end threaded to accept the barrel. The threaded shank of the barrel is .625" long, .805" in diameter, with twenty V-threads per inch. Just to the rear of the threads the receiver has two openings, a long narrow one below to serve as the magazine well and a large one above for the loading port. A long L-slot is machined in the rear of the receiver to form a passageway and a locking shoulder for the root of the bolt handle. Opposite this slot, but entirely within the receiver, is another L-slot or groove to serve as the locking shoulder for the locking lug on the left side of the bolt cocking sleeve.

The bolt assembly consists of fourteen parts. The main part is the bolt body. Its front end is machined to accept the right- and left-hand extractors, which are held in place by

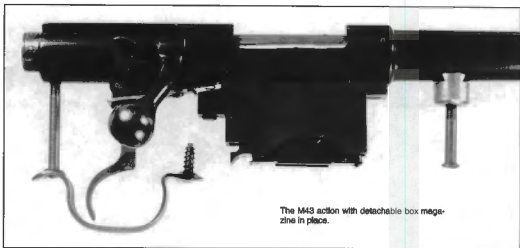
two small pins and tensioned by two small springs. The right-hand one does most of the work of extraction while the left one assists in ejection. The face of the barrel is flat except there are two small slots cut into it for the ends of the extractor hooks. The recess for the cartridge is in the face of the bolt. The lower section of this recess is cut away where the underside of the front of the bolt is flat. Thus, when the bolt strips a cartridge from the magazine and pushes it into the chamber, the cartridge head slides up into the rim recess and under the extractor hooks, a feature that does away with the chances of double loading.

The rear part of the bolt is turned to a smaller diameter than the front, and over it is fitted the bolt cocking sleeve and the bolt sleeve. The bolt cocking sleeve is part of the bolt handle, the root or base of which serves as one of the locking lugs. Opposite it is a larger locking lug, with both lugs sliding in and locking in L-shaped slots in the receiver. A triangular notch in the bottom rear of the bolt cocking sleeve serves to cock the striker on the uplift of the bolt handle. The bolt handle has a pear-shaped grasping knob and a swept-back stem.

Inside the bolt is the one-piece striker or firing pin. It is powered by a strong coil spring. The rear of the bolt is fully enclosed by a plug, and the entire bolt assembly is held together by a pin through the rear end of the bolt sleeve, bolt body and bolt plug. Another cross pin through the bolt and firing pin is located under the bolt cocking sleeve. A projection below the firing pin engages in the cocking notch in the bolt cocking sleeve.

The trigger and safety mechanism is fitted in machined cuts on the bottom of the receiver.

(Above) The Model 43 Winchester Standard rifle. It was made from 1949 to 1957 in calibers 22 Hornet, 218 Bee, 25-20, and 32-20.



The M43 action with detachable box magazine in place.

er and is held in place, and pivots on a pin in a base dovetailed into the receiver. The trigger is of one-piece construction and is tensioned by a small coil spring located in a hole in the magazine holder, with the spring bearing against the underside front of the trigger. A cap screw below the trigger spring provides the means for a limited amount of weight-of-pull adjustment to the trigger. A projection on the upper front of the trigger serves as the sear to engage with a matching sear in the bottom of the striker. The front end of the trigger also serves as the bolt-stop, coming into contact with a projection on the bottom front of the bolt when it is opened.

There are several parts to the safety. The safety pivot itself is mounted on the trigger pivot pin on the right side of the trigger and receiver. On the safety button there are two arms, with the one up front and on top extending inside the receiver to engage in a notch in the bolt cocking sleeve when the safety is applied, locking the bolt closed. The second arm on the safety button engages with the safety bar which is mounted and slides on the top of the trigger. This bar slides partly in grooves and also is held in position by a small screw. A small spring and plunger in the trigger, and bearing against the safety bar, provides the tension to the safety. The sears are locked in engagement when the safety is tipped back, effectively sliding the safety bar forward so that its front end engages over the edge of the magazine holder.

The magazine holder is a steel box-like affair attached to the bottom of the receiver with a screw at its front end and a cross pin at its rear. The magazine catch positioned in the rear end of this box is also hung on the pin that holds the box. Tension is provided to the

catch by a small spring between it and the magazine holder rear wall. The magazine and the simple trigger guard are stampings.

The barrel and action assembly is held on the stock by two screws; the front one goes through the stock and is threaded into a large diameter stud dovetailed into the breech end of the barrel, and the rear screw goes through the rear of the trigger guard and stock and is threaded into the receiver. The front stud also serves as the recoil lug. A wood screw holds the front of the trigger guard in place.

Comments

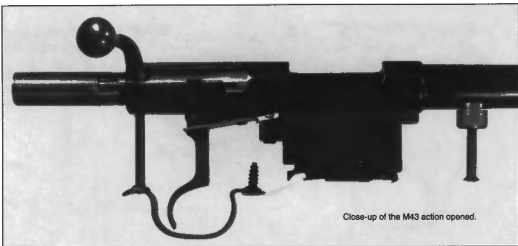
As I mentioned previously, the Winchester Model 43 action is a beefed-up Model 69A Winchester, differing mostly in that it is somewhat larger and heavier, with two locking lugs instead of one and with a different magazine catch. I have owned and used three M43 rifles and worked on a few others. I am now inclined to believe that this action is only marginal in strength for the 22 Hornet and 218 Bee cartridges. I say this because one of the rifles I fired more than just a few times developed excessive headspace. Also, I have heard from other M43 owners that their rifles in these two calibers have developed headspace problems. Anyway, this problem has happened too often for me not to take notice of it.

I suspect that the increasing headspace condition resulted from too little locking contact area to hold the bolt securely forward in the receiver. In other words, I believe it was a design fault. I do not think this would have occurred had the bolt, receiver and the bolt cocking sleeve been made larger in diameter so that the locking lug area could have been increased by 25 to 50 percent or

more. It seems to me that the designers held the size of everything about the action to the minimum.

Part of the headspace condition in some M43 rifles may have been due to a poor fit of the locking lugs and locking shoulders, perhaps an uneven fit with one lug bearing and not the other. Or, the surfaces of the contacting areas were not finished smooth so that wear occurred rapidly. Whatever the reason, it happened. Faulty heat-treatment of the receiver, bolt and bolt cocking sleeve may also have contributed to this problem. Before these receivers were factory drilled and tapped for scope mounts, I noticed considerable differences in the hardness from one rifle to another when drilling them for scope mounts. As time passed I began advising owners of this rifle not to have the chambers improved.

The trigger mechanism of the M43 Winchester is not the best, although if the shooter did not mind a four- to five-pound trigger pull and did not fire the rifle a great deal, it was generally satisfactory. Even though the tension of the trigger spring could be increased or decreased by turning the cap screw, this did very little to change the trigger's weight of pull. There is nothing wrong with the striker or mainspring, the lock time is very short and fast, and the ignition positive, but to achieve this a very stiff mainspring was required. This, plus the direct trigger-to-striker contact, requires a goodly amount of sear engagement to keep the rifle safe and to minimize sear wear. Even so, sear wear did occur and this caused a problem with safety. The solution would have been to provide a pressure reduction lever or plunger between the trigger and the striker, as was done with the Model 70 rifle.



Close-up of the M43 action opened.

Curse-curing

I have seen various ways in which gunsmiths have attempted to correct excessive headspace in M43 Winchester rifles, and some of these require no welding and can be repeated as often as headspace correction is needed. It is the shim or washer method—a washer placed between the bolt cocking sleeve and the bolt body. The shim washer is a bit difficult to make because it has to be quite narrow and thin, but it is the very best way I know of to fix the problem.

First determine if the gun has excessive headspace. You'll notice this condition if you are experiencing case separation or if some of the fired cases show primer protrusion. A very simple way to prove excessive headspace is to chamber a primed case in the rifle and pull the trigger. If the fired primer does not protrude over .004", the rifle is okay with headspace within normal limits. However, if protrusion is more than .004", and especially if you reload for it, I would advise correcting the headspace to no more than

.002". If, for example, the primer protrudes .008", make a shim washer for the bolt .006" thick, place it between the bolt cocking sleeve and the bolt and the excessive headspace is corrected.

I make this washer from drill rod, turning a piece of it down to bolt body diameter and boring it out to the inside diameter of the bolt sleeve. Then I face it off very smooth and cut a washer off it the thickness required. I do not always get the first one right but that is the way I do it.

I have long had the urge to remodel a Model 43 Winchester into a Griffin & Howe-style sporter. It is the perfect rifle for this sort of project.

A simple remodeling job would require no metal work but just a stock rework. There is more than ample wood in the factory stock to trim it into a G&H classic. Install a checkered steel grip cap and a horn or ebony forend tip, remove all excess wood above the level of the buttplate, grip cap and forend tip, sand it smooth and level, give it an oil finish, checker it, and you will have a changed rifle. Remod-

eling can be done with either the Standard or Special model, and on the Special model that means removing the rather poorly done factory checkering in the process. If you are good with wood and have a piece of walnut that matches the stock, make and glue on a G&H-style cheekpiece. G&H used to do this with factory stocks and you could hardly find the glue joint.

If you really want to do a real bang-up job, get a Fajen sporter stock of fancy walnut and G&H that stock. If it were my rifle, I would want the forend made about 2" shorter than the factory stock; I'd shorten the barrel by that much too, install a Williams front sight ramp and polish and reblue the metal.

Takedown and Assembly

Make sure the rifle is unloaded and the magazine empty. To remove the bolt, raise the bolt handle, pull and hold the trigger all the way back and withdraw the bolt. To reinsert the bolt, first make sure that the striker is cocked, replace it in the receiver with the bolt

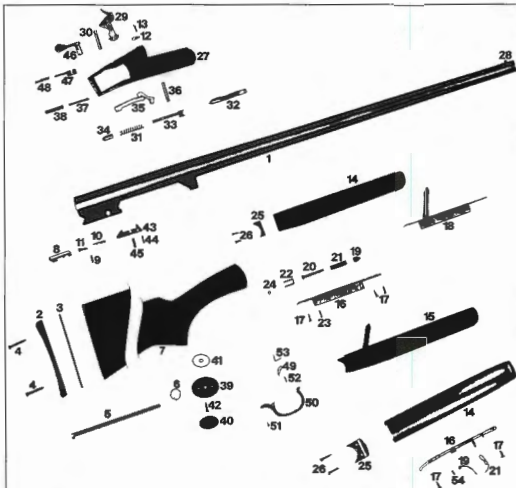
Winchester M43 Rifle

Winchester Action Specifications

Action length	6.300"
Receiver diameter	1.050"
Bolt diameter	.687"
Bolt travel	2.025"
Striker travel	.210"

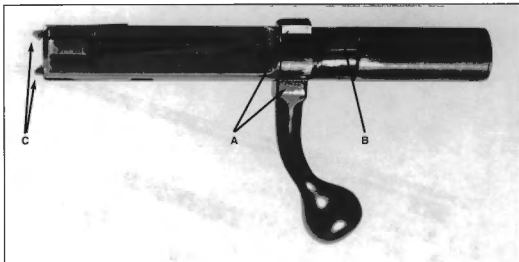
General Specifications

Type	.....	Turnbolt repeater, manually operated.
Receiver	.....	One-piece tubular, machined alloy steel.
Bolt	.....	Non-rotating bolt body, separate rotating bolt cocking sleeve with dual locking lugs on bolt cocking sleeve.
Ignition	.....	Composed of one-piece striker and coil mainspring; cocks on opening bolt.
Magazine	.....	Detachable flush box magazine, three-shot capacity (two-shot for 32-20).
Trigger	.....	One-piece trigger in direct contact with striker, single-stage pull, limited weight of pull adjustment.
Safety	.....	Pivoting side safety, locks trigger and bolt.
Extractor	.....	Twin extractors in bolt head, left one aids ejection.
Ejector	.....	Stationary bar, ejects cases to the right.



Parts Legend

- | | | |
|-------------------------------|------------------------------------|---------------------------------|
| 1 Barrel | 18 Forearm Catch Plate Assembly | 37 Locking Bolt Plunger |
| 2 Buttplate | 19 Forearm Retainer | 38 Locking Bolt Plunger Spring |
| 3 Buttplate Spacer | 20 Forearm Retainer Rod | 39 Pistol Grip Cap |
| 4 Buttplate Screws | 21 Forearm Retainer Spring | 40 Pistol Grip Cap Insert |
| 5 Butstock Bolt | 22 Forearm Retainer Bracket | 41 Pistol Grip Cap Spacer |
| 6 Butstock Bolt Washer | 23 Forearm Retainer Bracket Pin | 42 Pistol Grip Cap Screw |
| 7 Butstock Complete | 24 Forearm Retainer Bracket Spring | 43 Extractor Sear |
| 8 Extractor | 25 Forearm Spacer | 44 Extractor Sear Pin |
| 9 Extractor Pin | 26 Forearm Spacer Screws | 45 Extractor Sear Retaining Pin |
| 10 Extractor Spring | 27 Frame | 46 Top Lever |
| 11 Extractor Spring Plunger | 28 Front Sight | 47 Top Lever Plunger |
| 12 Firing Pin | 29 Hammer | 48 Top Lever Plunger Spring |
| 13 Firing Pin Retaining Screw | 30 Hammer Pin | 49 Trigger |
| 14 Forearm | 31 Hammer Spring | 50 Trigger Guard |
| 15 Forearm Complete | 32 Hammer Spring Assembly | 51 Trigger Guard Screw |
| 16 Forearm Catch Plate | 33 Hammer Spring Plunger | 52 Trigger Pin |
| 17 Forearm Catch Plate Screws | 34 Hammer Spring Plunger Bushing | 53 Trigger Spring |
| | 35 Locking Bolt and Connecting Rod | 54 Forearm Catch Plate Pin |
| | 36 Locking Bolt Pin | |



Underside view of the M43 bolt showing: (A) dual locking lugs, (B) cocking piece, and (C) twin extractors.

handle aligned with its slot, pull the trigger back and push the bolt all the way in.

To remove the barrel and action from the stock, turn out the rear trigger guard screw and the forend screw and lift the barrel and action assembly from the stock. Replace in reverse order.

To disassemble the bolt, remove it from the receiver and uncock it by turning the bolt handle down. Drive out the cross pin from the rear of the bolt and remove the bolt plug, bolt sleeve and mainspring. Next, slide the bolt cocking sleeve back to expose the cross pin underneath and drive it out and remove the bolt cocking sleeve and striker. Drive out the two extractor pins and remove the extractor springs. Reassemble in reverse order.

To disassemble the magazine holder parts, drive out the cross pin that holds the magazine catch and remove the catch and its spring. Turn out the screw from the front of the holder and remove the holder. Reassemble in reverse order.

To disassemble the trigger and safety parts, if done before removing the magazine holder, turn out the trigger spring adjustment cap

screw and remove the trigger spring. Then drive out the trigger-safety pin and remove the trigger and safety parts. Remove the safety, turn out the safety bar screw and remove the safety bar and its spring and plunger. Reassemble in reverse order.

The barrel is threaded very tightly into the receiver and it is difficult to remove unless proper tools are used.

Markings

The Model 43 Winchester rifle is marked as follows: Stamped on the left side of the barrel:

MADE IN NEW HAVEN, CONN. U.S.
OF AMERICA
WINCHESTER PROOF STEEL
WINCHESTER
TRADE MARK
MODEL 43 (and caliber designation)

The serial number is stamped on the receiver ring, on the left side of early manufacture and on the right side on others. The Winchester proofmark, letters WP within an oval, is stamped on the barrel and receiver breech.

Conclusion

Despite my critical comments about the M43 Winchester rifle, I have always liked it. The one that I did considerable shooting with (in 218 Bee caliber) was quite accurate. It was most accurate with handloads, with the bullets seated out far enough so that the cartridges were too long to enter the magazine. But, then as now, I considered the Model 43 action a bit undersized for the 22 Hornet and 218 Bee cartridges. If I had owned a M43 in 25-20 caliber it would have promptly been G&H'ed, for I like this cartridge, and I think this action is perfect for it. Even so, I have always felt this rifle was not proportioned right; either its action was a bit too small for the size of the stock and barrel, or the stock and barrel were somewhat too large for the action. Anyway, the M43 was not a success for Winchester, neither in the number made nor length of time it was manufactured. Maybe it was for lack of sales or for some other reason that Winchester ceased its manufacture, but after being on the market only eight years, in which time about 62,617 were manufactured, the Model 43 became obsolete.



THIS CHAPTER IS about the rebirth of the Rifleman's Rifle—the Model 70 as made between 1936 and 1964. Since that time a lot of changes have occurred at the Winchester plant in New Haven, Conn., some of which I have related in the previous chapter. I need not re-tell them here and I will skip the years between 1964 to around 1990.

The greatest change at that time at the U.S. Repeating Arms Company was that Browning bought the assets of U.S.R.A.C., and both became part of a French conglomerate. Some important decisions were made, one of which was to tear down the old multi-story Winchester plant and get rid of all the old well-worn machinery that in years past made the many fine Winchester rifles. When this was done, a brand new and modern Winchester plant was built on the original site and filled with ten fast-moving, high-tech machines. And in this new plant the M70 was reborn, to be known as the Classic line. My M70 Classic came from this new plant.

Perhaps the best and most practical way to describe the Classic Model 70 Winchester is to compare it point by point and feature by feature with the standard pre-1964 Model 70 described in a previous chapter. I will do this because these two models have much in common yet are different. The Classic is truly a Classic any way you look at it, but it has a number of things that are new. To be honest, I must say that some of the features are minor, but these, added to a couple of important changes, make the Classic a better rifle. As much as my old-timers revere the pre-'64 model, it must be said that the Classic is an updated and improved rifle with changes that actually make it a better gun. So, starting from the muzzle and working back, here is what you will find on the Classic.

The Classic has no front sight or ramp. Most old-timers are so used to seeing a ramp and sight on the end of a rifle barrel that they will surely miss it on the Classic, even though

they may never use it. This rifle has always deserved a telescopic sight, and that is the sighting equipment usually employed. So then, why a front sight?

Another feature so prominent on the pre-'64 is the swell or band near the breech of the barrel, which was of limited usefulness. Two dovetail slots in this band, one on top and one on the bottom, were there to hold the rear open sight and a threaded forend stud. On the modern rifle such a band is not needed. It was wisely left off the Classic barrel, making the barrel much easier to make. In addition, the forend swell was also done away with on the Classic stock.

A noticeable change between the old and the new M70 actions is the way the receiver is finished; the pre-'64 receiver had a dull matte black finish while the Classic receiver is highly polished and blued. Naturally, the receiver is drilled and tapped for mounting a scope. Some of the early pre-'64 rifles were not so provided, but their receivers were always drilled and tapped to accept a receiver aperture sight. The Classic has no such provision for mounting a receiver sight.

Now comes the stock, and on the Classic some changes have taken place. Oh, it is still the same classic pre-'64 stock, but with some added features to make it even better. Because there are no open sights or provisions made to readily install any, the Classic stock is made with a slightly higher comb for better sighting with a scope. The comb could have been made higher still and, in my opinion, that would have made the stock even better for scope sighting. And on the new Classic you cannot overlook the cheekpiece. It is a dandy, well shaped, sized and finished. It is a feature that is not really needed, but most riflemen seem to want it. A solid rubber buttpad replaced the steel buttplate on the old rifle.

Replaced also on the Classic are the non-detachable sling swivels of the pre-'64 stock.

Now we have neat sling swivel studs. High time, too, and a welcome change. If the rifle is to be called a Classic, then a grip cap is a must, and this Classic stock has a very neat classic-style grip cap.

The advertising literature points out that the stock has a dull oil finish. That it has, and I like it, but the finisher did not get the finish applied evenly or all over. No matter, I can correct that with a few drops of Lin-Speed rubbed on by hand.

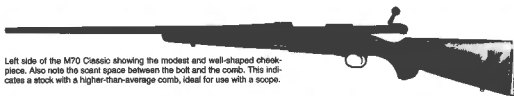
Another improvement is the checkering. There is more of it and it is done better. The diamonds are sharp and clean, and the checkering on the forend starts on one side and extends all the way around to the other side. There is nothing fancy about it, but you sure can feel it is there when handling the rifle.

What else that is visible on the outside of this rifle is different? The ring of checkering on the bolt handle knob, that's what. I am not sure whether it is an improvement or not, but it is not at all bad. No doubt it is rolled on, but it is well done. Anyway, on my rifle, at least, it is far superior to a similar checkering attempt on my Weatherby Vanguard rifle.

All the other visible features seem to be the same as on the original pre-'64 Winchester. The trigger guard, hinged floorplate, floorplate catch, trigger, bolt-stop, safety, bolt sleeve, cocking piece, bolt handle shape and the extractor have not been changed. There was no way that these things could be improved; they were perfect to begin with.

However, a close look at the bolt will show that something on it has changed. On the middle section of the pre-'64 bolt there is

(Above) Winchester's Model 70 Classic, a rebirth of the famed Model 70 made between 1936 and 1964. The Classic has all the basic features of the original M70, plus a few noteworthy ones of its own.



Left side of the M70 Classic showing the modest and well-shaped cheekpiece. Also note the scant space between the bolt and the comb. This indicates a stock with a higher-than-average comb, ideal for use with a scope.



Winchester Model 70 Classic with controlled-feed bolt.

a small hump with one side of it cut off square, so that on opening the bolt this small flat surface contacts the lower edge of the left locking lug raceway. This feature serves as an anti-bind feature. It is to some extent, but the hump was not easily manufactured. This feature was eliminated on the Classic bolt. To see the new anti-bind arrangement, the bolt has to be removed. It consists of a groove cut into the lower edge of the right locking lug, and a ridge machined on the upper edge of the right receiver wall. The result is that the anti-bind system is exactly like that used in the post-'64 Model 70 action, and this is described in a nearby chapter. The Weatherby Vanguard action has a similar arrangement. A feature which was not changed from the pre-'64 M70 to the Classic model is the breech system. The breech end of the barrel is funnel shaped—breeching long used in the 1903 Springfield, M17 Enfield and M54 Winchester.

Elsewhere in this book I have commented several times concerning this breeching method. I have no quarrel with it. The only sore spot with it is the flat spot in its circumference needed to accommodate the hook on the Mauser-type extractor. The Springfields and the Enfield M17s have the same system, and in the great many shots I have fired with these, as well as with the Winchester M54 and 70, I have seldom encountered any feeding problems.

I have also commented at length on the pros and cons on the so-called safety breeching. Years ago there was quite a controversy about this. The weak point of the cone breeching and the so called "safety" method is the slot cut into the barrel for the extractor hook. I have installed barrels using the safety breeching method and, frankly, I see no great advantage in it.

Like the pre-'64 M70, the Classic barrel and action are held in the stock by three guard screws, one at the back of the trigger guard, one in front of the hinged floorplate, and one in front of the trigger guard hidden by the floorplate. No bolt-action rifle I can think of has a better tie-down system than the Winchester M70. On removing the barrel and action from my Classic stock, I was surprised to find a far better than average machine inletting job. I also found that a bedding compound was used in the recoil lug area.

The piece of walnut used to make my stock was hard and dense. I had expected it to be a piece of plain walnut, but it was well figured and colored. I am sure this rifle was not specially selected for me because the rifle was shipped from the factory to a jobber, then from the jobber to my dealer and then to me. However, I do expect that most Classic stocks will have plain but good quality walnut.

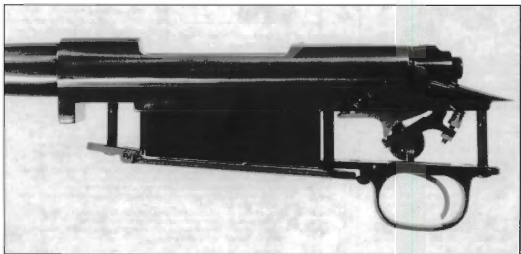
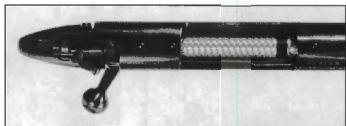
The trigger mechanism seems to be identical to the one used in all earlier M70s, and a better trigger mechanism on a hunting rifle

does not exist. It could hardly be made simpler or more direct. This trigger suited my son Mark at Camp Perry when he won an important 1000-yard match using a pre-'64 M70, and during his four years on the Marine Corps rifle team. It is a mighty good trigger. My rifle came to me with a trigger pull of around five pounds, but I quickly adjusted it to about a three-pound pull. That is the only adjustment this trigger has, but it does not need more than that. There are a lot of rifle shooters who do not agree with me on this, but there are a lot of shooters who can't be satisfied with any trigger. They always blame their poor target scores and missed shots at game on a lousy trigger.

I wish that Winchester had chosen a new model designation for the rifle that was to replace the original Model 70; that is, the rifle they introduced in 1964 and which will be known as the post-'64 Model 70. This rifle, with the Model 70 name, fooled some buyers, but those who were not fooled didn't buy it. Winchester should have named it something else right off. Now there are three Model 70s and this leads to confusion. What is more, even after the Classic was introduced Winchester continued to market the post-'64 model. I feel, and I believe so do many others, that the post-'64 model should have been dropped completely. Nevertheless, the new Model 70 Classic will win out. Anyway, there are two true Model 70s—the pre-'64 model and the



These three photos of the M70 Classic action show the right, top and left views. There is very little difference from the pre-'64 M70 action.

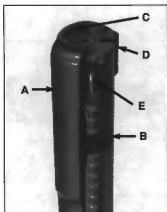




Left-side view of the M70 Classic action with the bolt open.



Comparison of the old, original pre-war safety of the early Model 70 Winchester bolt (top) and the later version.



This view of the Classic M70 bolt head shows: (A) Mauser-type extractor, (B) extractor collar, (C) bolt face recess, (D) ejector groove and (E) groove for the anti-bind system. This groove is at the bottom of the right locking lug.

post-'93 model. They are not exactly alike, but enough so that the new model is a true old model. However, while both were and still are manufactured in a similar manner, the manufacturing processes differ greatly.

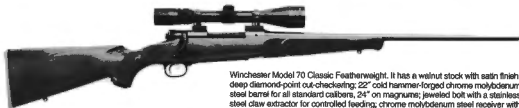
Let's for a moment forget about the middle post-'64 masquerader Model 70 and discuss how the old and new actions are made. The manufacture of the bolt and receiver for both rifles starts with a solid chunk of steel. In the old factory, many machine operations were required to make these parts, requiring more than just a few machines to saw, mill, turn, drill, thread, shape and bore this hunk of metal into a receiver. This also required an operator for each of these machines, a lot of man hours and considerable cost. In the new plant with all new, modern and high-tech, tape-controlled automatic machines, these two parts are more or less completely finished using fewer machines, fewer operators and a lot less time. It is difficult for me to imagine all of this modern high-tech goings-on, but in a modern up-to-date factory I have to believe it. Of course, it is not all as simple as I have made it, but it sure is dif-

Dimensional Action Specifications

Action weight	48 oz.
Receiver length	9.250"
Receiver ring diameter	1.335"
Bolt diameter	.695"
Bolt travel	4.582" for 30-06 length
.....cartridges, more for longer	
.....cartridges, less for shorter ones.	
Firing pin travel	.290"
Guard screw spacing	7.625"
Guard screw threads	1/4 x 32

General Specifications

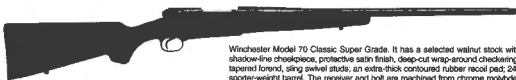
Type	.....Tumbolt repeater, operated by bolt handle.
Receiver	.....One-piece construction entirely machined and fabricated from a block of hi-tech steel. Has integral recoil lug, tapped and drilled for scope mounts.
Bolt	.....One-piece construction, dual opposed forward locking lugs, root of bolt handle serves as safety lug, low-profile bolt handle.
Ignition	.....One-piece firing pin (striker), coil mainspring, cocks on up-lift of bolt handle.
Magazine	.....Staggered-column, hinged floorplate, W-shaped follower spring.
Trigger	.....Single-stage adjustable for weight of pull and over-travel.
Safety	.....Low profile pivotal three position safety mounted on bolt sleeve, locks both firing pin and bolt.
Extractor	.....Non-rotating one-piece M98 Mauser type attached to bolt by a collar.
Ejector	.....Spring-tensioned lever mounted in rear bottom of receiver.
Bolt-stop	.....Spring-tensioned lever mounted in receiver stops bolt travel by contacting a bar positioned behind left locking lug.



Winchester Model 70 Classic Featherweight. It has a walnut stock with satin finish, deep diamond-point out-checkering; 22" cold hammer-forged chrome molybdenum steel barrel for all standard calibers, 24" on magnums; jeweled bolt with a stainless steel claw extractor for controlled feeding; chrome molybdenum steel receiver with massive recoil lug; drilled and tapped for scope mounting; three-position safety. It's chambered for 270 Win., 280 Rem. and 30-06.



Winchester Model 70 Classic Super Express. The stock is reinforced with two steel cross bolts. Also featured are deep-cut wrap-around checkering; forward sling swivel mounted on barrel for hand protection from recoil and improved carrying balance; adjustable open rear sight and hooded ramp front; a 1-inch recoil pad; drilled and tapped for scope; jeweled bolt with stainless steel claw extractor for controlled feeding. It's suited for African big game in two calibers, 375 H&H Mag. (24" barrel) and 458 Win. Mag. (22" barrel).



Winchester Model 70 Classic Super Grade. It has a selected walnut stock with shadow-line cheekpiece, protective satin finish, deep-cut wrap-around checkering, tapered forend, sling swivel studs; an extra-thick contoured rubber recoil pad; 24" sporter-weight barrel. The receiver and bolt are machined from chrome molybdenum steel. The rifle also has a hinged steel floorplate and stainless steel magazine follower, single reinforcing cross bolt and three-position safety. The Super Grade is offered in three powerful belted magnum calibers: 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., plus 270 Win. and 30-06.

ferent from what had to be done in an old factory with old machines.

On my new Model 70 Classic, the machines (or somebody) goofed a bit. For one thing, the rubber buttpad got attached a trifle too high, and it is something I will have to correct. Next, the machine did not trim off enough from around the end of the pistol grip, or a too-small grip cap was used. I will try to find a larger cap and correct this. The last small complaint about my rifle is that the bolt handle is very stiff to lift

and lower. I will have to investigate this, and perhaps it will be just a simple matter to correct.

What with all this modern machinery, I suppose the stock is also shaped and finished this way, and the checkering is most likely done by the laser method. Perhaps that accounts for the large area of checkering. Anyway, it is good checkering, and the outside of the stock is perfectly level and smooth. The inletting is also good.

The Classic M70 is disassembled and

reassembled exactly as outlined in the chapter on the pre-'64 M70.

In the 1994 Winchester catalog, the following different Model 70 Classic rifles are listed: Model 70 Classic Custom Sharpshooter, Model 70 Classic Stainless, Model 70 Classic DBM (Detachable Box Magazine) with wood stock, Model 70 Classic Sporter, Model 70 Classic SM and Model 70 Classic DBM-S rifle with synthetic stock.

Three other models are shown and described nearby.



Winchester Model 70 Post-'64

AFTER MAKING the M70 rifle for 27 years, and having made over a half-million of them, Winchester suddenly discontinued it in early 1964 and introduced a "new" M70. This immediately became known as the "New Model 70," while the one dropped became the "pre-'64 Model 70"—designations which M70 fans adopted to distinguish the two. (However, since then still another Model 70 has been introduced and Winchester has designated it as the M70 Classic, and it will be described in another chapter.) Whatever the reason or reasons for dropping the time-tested old model, M70 fans were seemingly aghast that Winchester could do such a thing. At any rate, early in 1964, and beginning with serial number 700,000 (all M70 Winchester rifles with a serial number below 700,000 are the old or pre-'64 models), the new M70 was put on the market.

The "New Model 70" rifles were quite different from the old. Five different models were initially introduced: the Standard model with 22" full-floating barrel in 243, 270, 30-06 and 308; a Magnum model with 24" barrel in 264, 300, 338 and 375 H&H, all magnums; a Vermont model with 24" medium-heavy barrel in 243; a Target model with 24" heavy barrel in 30-06, and the African model with 22" barrel in 458 Magnum. Introduced with the Standard and Magnum models was a stock with a Monte Carlo cheekpiece, high gloss finish and impressed checkering. The barrels were also new, that is, they were made by the cold-swaged or "hammer-swaged" process. The biggest mechanical change, however, was in the action, and it was these changes that caused M70 shooters to howl.

The post-1964 M70 has a receiver longer and somewhat heavier than the old one. The increased length is the result of making the tang longer. The new receiver is not entirely machined—the bottom appears to be an investment casting, although Winchester describes it as being "precision forged," with the forging done in dies. Beginning with the receiver, it is evident that many shortcuts were made to reduce manufacturing costs.

The bolt is made in three sections, brazed together. The bolt head, with its heavy unslotted dual opposed locking lugs, is brazed to the front end of the bolt body cylinder. A plunger-type ejector and its small coil spring fit into a hole at the edge of the bolt-face recess, retained there by a small cross pin. The extractor, a small sliding wedge fitted in a mortise cut into the front of the right locking lug, is tensioned by a small spring and plunger. The bolt face is deeply recessed for the cartridge head, and both locking lugs are flush with the front of the bolt. The breech end of the barrel, no longer coned, has a flat breech face, and is not recessed for the head of the bolt. The barrel boss, which had formerly held the rear open sight and which the forend screw entered, was abandoned.

The bolt handle has a short sleeve on its base that is brazed over a turned-down portion of the rear of the bolt-body cylinder. Otherwise the bolt handle and pear-shaped grasping ball are like those on the old M70 action. There is no stop/guide lug on the bolt body as on the old M70 bolt, but the new bolt has the same extractor cam surface. The approaches to the receiver locking-lug shoulders are angled, forcing the bolt forward as the bolt handle is pushed down.

The new bolt sleeve, bolt-sleeve lock and safety are essentially like those used on the old M70, except that the firing-pin stop screw has been eliminated. The end of the bolt sleeve is covered with a metal cap held in place by a cross pin.

The new model firing pin is also different. It has a shorter cocking-piece and, in addition, it has a lip which projects rearward under the bolt sleeve cap. This lip, serrated and painted red, acts as a cocking indicator which can be felt and seen when the action is cocked. The mainspring, compressed over the firing pin, is held in place by a washer and U-shaped retainer collar which lies in a groove in the firing pin.

The bolt-stop is the same type as before except that it is tensioned by a wire spring on the headed trigger pin, instead of the

spring-and-plunger arrangement used before. Five different lengths of bolt-stops are made for the different cartridge lengths this action can handle. These are the H&H Magnum, 30-06 and short magnum, 308, 22-250 and 222 lengths.

The trigger mechanism of the new M70 is the same as on the old model, except that the curved trigger finger-piece is about double the width of the old trigger.

No changes were made in the magazine, floorplate and trigger guard arrangement except that the guard, floorplate and hinge plate are made of an aluminum alloy. Made of some lightweight metal, the follower is riveted to the follower spring in the new M70. The same three guard screws are used to hold the action to the stock.

What does this all add up to? The main changes made are these: the method of breeching, with the flat end of the bolt head nearly contacting the flat breech face of the barrel; eliminating the long Mauser-type extractor and its collar, using instead a small and easily-made sliding extractor fitted in the bolt head; eliminating the flat pivot-type ejector, substituting a plunger-type in the bolt head; having a deeply-recessed bolt face so that the cartridge head is fully encircled and supported by a ring of steel; providing a cap for the bolt sleeve to cover the cocking cam head, and providing a cocking indicator.

When the new M70 rifles began appear on the market, virtually everyone familiar with the old M70 expressed disappointment. The new rifle was criticized no end, often by those who had not even seen it. As for me, I waited awhile before making any evaluation of it, but on the whole I thought the new breeching system was an improvement over the old, and I could see nothing at all wrong with the new ejector, bolt-sleeve cap and hammer-forged

(Above) Right-side view of a post-'64 Model 70 Winchester.



Post-'64 Model 70 Winchester action.

barrel. I also thought the extractor was adequate. It did not matter to me that the bolt was made in three pieces and beamed together. Of course, no one liked the aluminum alloy trigger guard and floorplate, and riveting the follower to the follower spring didn't help matters. I also heard complaints that the action was rough, that the bolt was sometimes difficult to operate and had a tendency to bind, and that feeding was not always positive.

The 1968 M70

No doubt the Winchester people heard of all these complaints and more, for some dealers—and gun writers—were very outspoken in their dislike of the so-called “new” M70. Winchester then set about making some of the needed changes and improvements. This they did when they introduced another “new” Model 70 Winchester early in 1968. Beginning at serial number 866,000, the following new features and improvements were made:

1) An “anti-bind” feature positively prevents bolt binding, making rapid operation of the bolt much surer and easier. This was done by adding metal under the right locking lug and cutting a narrow groove through it to separate it from the lug, then making a rib in the right side of the receiver for the anti-bind groove to slide over. This rib extends from the rear of the bridge forward to the inside of the receiver ring, ending at the locking shoulder edge. This rib is also the right cartridge-guide lip of the magazine well. When the bolt handle is raised, this anti-bind groove in the bolt head is aligned with the anti-bind rib, engaging it the moment the bolt is drawn back; it stays engaged the full bolt-travel distance. The anti-bind feature holds the bolt in line with the receiver regardless of the ten-

sion or pressure put on the bolt handle, so that the bolt will not bind or stick during operation. It's a very effective feature, the bolt being noticeably easier to operate than the bolt in any earlier M70 Winchester. Incidentally, the anti-bind bolt won't fit earlier M70 receivers.

2) The floorplate is made of steel and finished in black-chrome plate, but the guard and the floorplate hinge plate are still made of a lightweight alloy, black anodized.

3) The follower, made of stainless steel and polished, has short lips underneath for attachment to the follower spring in the customary manner. This follower listed at \$7.85 in the 1969 Winchester parts catalog; with the new follower spring, it can be installed in the Post-'64 M70 to replace the riveted follower/follower-spring unit.

About the only other noticeable change made in the 1968 M70 action is that the receiver is polished, as opposed to the sandblast matte finish on previous models.

In 1969 Winchester added a new M70 chambering, the very popular 222 Remington. This was the first time Winchester had chambered any rifle for this cartridge since its introduction by Remington in 1950.

Evaluation

That Winchester decided to go back to the steel floorplate was good news; the finish will last longer, and it can be engraved to last. The new stainless steel follower is also an improvement, and it should eliminate any feeding problems. However, the most significant and noticeable improvement is the “anti-bind” feature. On receiving my first 1968 Model 70, I saw immediately that the bolt could be more easily operated than either previous 70s. There

is no tendency for the bolt to bind or stick on opening or closing, regardless of how the bolt is operated, twisted or pressured.

Model 70 Barreled Actions

To the best of my knowledge, Winchester never made separate M70 actions available, even to qualified gunsmiths. In 1965, however, they did make M70 barreled actions available to anyone. This assembly, completely finished (but without barrel sights) and ready to put into a stock, was made in the same barrel lengths, styles and calibers as was offered on their post-'64 M70 rifles. This included the standard sporter barreled action in calibers 22-250, 222 Remington, 225 Winchester, 243, 270, 30-06 and 308; magnum-calibered barreled actions in 264, 7mm Rem., 300 and 338; varmint-barreled actions in 222 Rem., 22-250, 225 Winchester and 243; target-barreled actions in 308 and 30-06 calibers. In 1968 the action of the barreled-action assembly included the same changes made in the rifles.

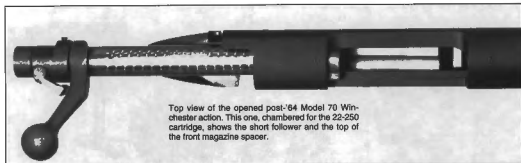
Markings

Receivers and barrels of the 1964 and 1968 M70 Winchester are marked quite similarly to the pre-'64 models.

Serial Numbers

Model 70 Winchester with a serial number below 700,000 are the “old” model, the pre-'64 version with the long Mauser-type extractor. I have no information as to just how many of these rifles were made, or at what number the serial number was started, or at what number manufacture ended, but manufacture was stopped before the 700,000 number was reached.

The post-'64 M70 rifles are all numbered



Top view of the opened post-'64 Model 70 Winchester action. This one, chambered for the 22-250 cartridge, shows the short follower and the top of the front magazine spacer.

between 700,000 and 866,000, but again I have no information as to how many were made, or at what number their manufacture ceased.

Model 70 rifles with a number above 866,000, and with the letter G preceding the serial number, are the 1968 version with the anti-bind feature, black-chrome floorplate and stainless steel follower.

Take-down and Assembly (Post-'64)

The instructions previously given for the take-down and assembly of the pre-'64 M70 applies to the post-'64 models except for the following: to remove the extractor, the extractor plunger is depressed with a pointed tool and the extractor slid out of its mortise; the ejector is removed by driving out the ejector pin from top to bottom. In removing the extractor and ejector, take care to prevent their

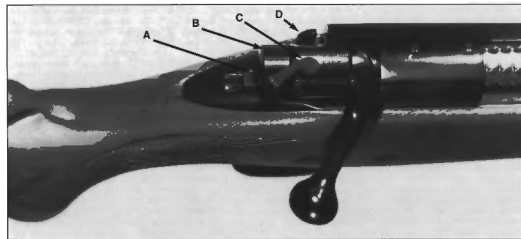
plungers and springs from flying out and being lost.

To remove the mainspring, it must be compressed slightly so that the retainer can be removed. Again, great care should be taken in doing this, as the mainspring is powerful. To remove the firing pin from the bolt sleeve after the mainspring is removed, drive out the bolt sleeve cap pin and pull off the bolt-sleeve cap. Reassemble in reverse order.

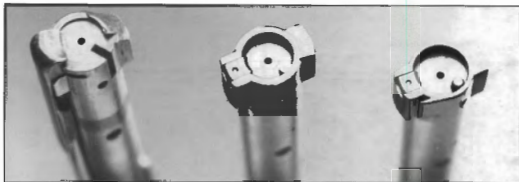
Model 70 Trigger Adjustment

This information applies to all M70s. To make any adjustments, the barrel and action must be removed from the stock. Only two trigger adjustments can be made readily: weight of pull and over-travel. The tools needed are a small screwdriver to turn the stop screw, and two small open-end wrenches to loosen, turn and tighten the jam nuts.

The illustration shows the main parts of the M70 trigger mechanism. Weight of pull is adjusted by first loosening the upper and lower jam nuts; now turn them clockwise to increase the spring tension and weight of pull, and vice versa. As sent from the factory the jam nuts are set for about a 4.5-pound let-off, which is adequately light for a hunting rifle. Many shooters prefer a lighter pull, and one about as light as 3 pounds can be had. If a lighter pull is wanted, it may be necessary to grind off from one-half to one coil of the trigger spring. After the weight-of-pull adjustment has been made, the two jam nuts must be tightened together to lock them in place. In any event, if an adjustment has been made to get a lighter pull, the action should be tested to make sure that there is enough trigger-spring tension to insure that the trigger will not slip off the sear when the bolt is slammed home. Test this by closing the bolt very smartly sev-



Top view of the rear of the post-'64 Model 70 Winchester action, showing: (A) cocking indicator (colored red), (B) bolt-sleeve cap, (C) safety, (D) bolt-stop release button.



The bolt heads of three different M70 Winchesters. On the left is the pre-'64 M70 bolt head showing the wall-beveled extractor hook and ejector slot. The M54 bolt head is the same. In the center is the post-'64 bolt head of M70s serial numbered between 700,000 and 866,000. Note the sliding extractor built into the right locking lug (shown on the left in this photo) and the plunger-type ejector. On the right is the late model post-'64 bolt head of the M70 Winchester, serial numbered over 866,000, showing the anti-bind feature—a groove under the right locking lug.

eral times on an empty chamber, and if the sear fails to hold (allowing the firing pin to fall), then the trigger pull adjustment is too light.

The other trigger adjustment readily made is the over-travel. Do this by loosening the stop-screw lock nut and turning the stop screw in or out as required. It should be adjusted (and it is usually so set at the factory) so that the trigger stops the moment the sear breaks from the trigger. This is best done as follows: loosen the lock nut and, with the action cocked, turn in the stop screw about one complete turn, or far enough so that on pulling the trigger the sear will not be released. Now with the action still cocked, and while pulling back on the trigger, slowly turn the stop screw out (counterclockwise) until the sear is released. Now turn the stop screw out at least $\frac{1}{4}$ -turn further so there is sufficient clearance between the sear and trigger, after the sear is released, to prevent the sear from hanging up. After the adjustment is made, the lock nut must be tightened to prevent the stop screw from turning.

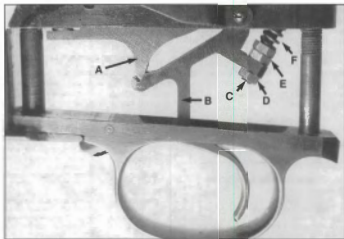
There is no adjustment for initial trigger take-up or "creep." If there is creep or roughness in the let-off, the pull can be made smooth by carefully honing the trigger-to-sear contact surfaces with a fine hard Arkansas stone. The honing must be done very carefully so that the breaking edges are left sharp, the surfaces left flat and without changing the angle of either surface. Trigger travel can be reduced by cutting the sear notch to reduce its depth, but you ought to have an extra trigger on hand before doing so—it is awfully easy to overdo it and leave the notch so shallow that the trigger might not hold the sear if the bolt is slammed home. Again, if any honing is done

on the sear surfaces, or if the trigger sear notch is cut down, the rapid bolt closing test should be repeated.

M70 and 770 Winchesters

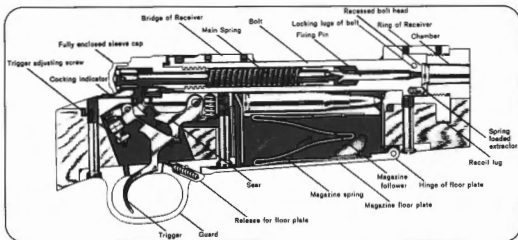
Winchester introduced a lower-priced version of the post-'64 M70 in 1966, calling it the Model 670. Offered in standard sporter, magnum and carbine styles in calibers 225, 243, 270, 264 Magnum, 30-06 and 300 Magnum, it had a hardwood stock stained to look like walnut. The main difference between the 670 and the 70 is in the action: 1) the sheet-

metal box magazine, which has a bottom, fits into a recess cut into the stock from the top. The box is thus entirely concealed within the stock, and no floorplate is used. The magazine can only be emptied by running the cartridges through the action. The follower is riveted to the follower spring. 2) A sliding safety is used, the safety button located on the right side of the receiver tang. When pulled back, a lever attached to the safety, and pivoted on the receiver, locks only the trigger so it cannot be pulled, 3) No separate bolt lock is used. The bolt sleeve is prevented from turning when



The M70 Winchester trigger (all models) showing: (A) sear, (B) trigger, (C) trigger-stop screw, (D) trigger-stop screw locknut, (E) trigger spring jam nut, (F) trigger spring. See text for details on how to adjust this trigger.

PART II: Commercial Rifles & Actions



In the above illustration, the rifle has a five shell in the chamber, ready to fire. When trigger is pulled, the sear releases the firing pin which protrudes through face of bolt and hits primer—exploding the cartridge in chamber. Action can then be opened by lifting and pulling back on bolt handle. Lifting motion cocks the firing pin, and with a camming motion frees the fired case from the chamber. Extractor pulls out fired case, ejecting it sideways. Near end of backward stroke, bolt uncovers fresh cartridge pushed up by spring-loaded magazine follower. On forward stroke the bolt pushes a fresh cartridge off the follower into the chamber, and when the bolt is turned downward to engage the locking lugs, the rifle is again ready to fire.

the bolt is open by the cocking-piece cam resting in a shallow notch in the rear of the bolt body, as in the M93 and M95 Mauser actions. No bolt-sleeve cap is used, the end of the cocking piece projecting through the rear of the bolt sleeve. A red-colored ring on the rear of the cocking piece shows when the action is cocked.

In virtually all other respects the M670 action is just like the post-'64 M700 action, including trigger, bolt, extractor, ejector, bolt-stop and receiver. The receiver is tapped for a receiver sight and top scope mount bases. The serial numbers, stamped on the receiver ring, began with number 100,000. This is a good action. In 1971 the Model 670 was offered only in 243 and 30-06.

The Model 770

Winchester introduced another version of the M70 in 1969, this one the M770. Priced

between the M70 and the M670, it's a sort of cross between the two. It has a walnut stock and a bolt like the M70, with the enclosed bolt sleeve, 3-position bolt-sleeve safety and anti-bind device. The trigger is also a copy of the M70. The rest of the rifle is like the M670. The action is a good one. The M770 was available in calibers 222, 22-250, 243, 270, 308, 30-06; and 264, 7mm or 300 Magnum. Separate 670 and 770 actions were not available, nor were barreled actions.

The Winchester Company's New Name

To learn what happened and to read about the reintroduction of the true Model 70 action which Winchester once made, read the chapter on the Model 70 Classic.

The sale of Winchester Repeating Arms Company of New Haven, Connecticut, was announced in 1981. With it came the news that the name was changed to U.S. Repeating Arms Company. The name Winchester will continue to be used on the firearms that the new company will manufacture.

Other M70 "New" Models

Some new models of rifles have been added, and some have been added and subsequently discontinued.

Following is a listing of some of the rifles that Winchester produced on the Post-'64 M700 action:

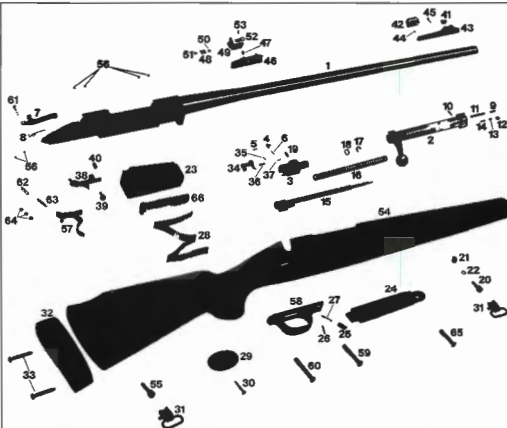
M700 XTR Sporter—Walnut stock with raised comb, cheekpiece, cut checkering, rub-

Dimensional Action Specifications

Weight	48 oz.
Receiver length	9.25"
Receiver ring diameter	1.340
Bolt diameter .....	.686
Bolt travel (see text)	Varies
Striker travel .....	.340
Magazine length (Post-64)	3.60
(Specimens provided for cartridges of different length.)	

General Specifications

Type	Bolt-action repeater, operated by bolt handle.
Receiver	One-piece steel construction with integral recoil lug, drilled and tapped for scope.
Bolt	Three-piece construction, dual forward locking lugs, low profile bolt handle.
Ignition	One-piece firing pin, coil mainspring, cocks on upturn of bolt handle.
Magazine	Non-detachable staggered column, hinged floorplate. (One model made with a detachable box magazine.)
Trigger	Single stage, adjustable.
Safety	Three-position safety mounted on bolt sleeve locks the firing pin and bolt in rearward position, locks only firing pin in intermediate position.
Extractor	Sliding type built in right locking lug.
Ejector	Spring-backed plunger in bolt head.
Bolt-stop	Lever type, stops bolt on contact with locking lug.

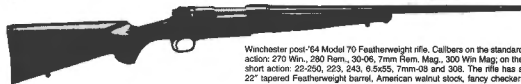


Parts Legend

- | | | | | | |
|----|-------------------------------|----|-------------------------------|----|----------------------------------|
| 1 | Barrel with Receiver Assembly | 23 | Magazine | 47 | Rear Sight Base Screw |
| 2 | Breechbolt | 24 | Magazine Cover Complete | 48 | Rear Sight Blade |
| 3 | Breechbolt Sleeve | 25 | Magazine Cover Catch | 49 | Rear Sight Blade Holder Assembly |
| 4 | Breechbolt Sleeve Lock | 26 | Magazine Cover Catch Pin | 50 | Rear Sight Blade Nut |
| 5 | Breechbolt Sleeve Lock Pin | 27 | Magazine Cover Catch Spring | 51 | Rear Sight Blade Screw |
| 6 | Breechbolt Sleeve Lock Spring | 28 | Magazine Spring | 52 | Rear Sight Blade Spring |
| 7 | Bolt-stop | 29 | Pistol Grip Cap | 53 | Rear Sight Windage Screw |
| 8 | Bolt-stop Spring | 30 | Pistol Grip Cap Screw | 54 | Stock Complete |
| 9 | Ejector | 31 | Quick Detachable Swivels | 55 | Stock Swivel Stud |
| 10 | Ejector Pin | 32 | Recoil Pad | 56 | Telescope Sight Base Plug Screws |
| 11 | Ejector Spring | 33 | Recoil Pad Screws | 57 | Trigger |
| 12 | Extractor | 34 | Safety | 58 | Trigger Guard |
| 13 | Extractor Plunger | 35 | Safety Pin | 59 | Trigger Guard Screw, Front |
| 14 | Extractor Spring | 36 | Safety Plunger | 60 | Trigger Guard Screw, Rear |
| 15 | Firing Pin | 37 | Safety Plunger Spring | 61 | Trigger Pin |
| 16 | Firing Pin Spring | 38 | Sear | 62 | Trigger Spring |
| 17 | Firing Pin Spring Retainer | 39 | Sear Pin | 63 | Trigger Stop Screw |
| 18 | Firing Pin Spring Washer | 40 | Sear Spring | 64 | Trigger Stop Screw Nuts |
| 19 | Firing Pin Stop Screw | 41 | Front Sight | 65 | Cover Hinge Plate Screw |
| 20 | Forearm Screw Eye | 42 | Front Sight Cover | 66 | Magazine Followw |
| 21 | Forearm Screw Eye Escutcheon | 43 | Front Sight Ramp | | |
| 22 | Forearm Screw Eye Washer | 44 | Front Sight Ramp Screw, Short | | |
| | | 45 | Front Sight Ramp Screw, Long | | |
| | | 46 | Rear Sight Base | | |



Winchester post-'64 Model 70 Sporter rifle. Walnut stock with Monte Carlo comb, checkered grip and forend. Calibers: 25-06, 270 Win., 270 Wea. Mag., 30-06, 264 Win. Mag., 7mm Rem. Mag., 300 Win. Mag., 300 Wea. Mag., 338 Win. Mag., 3-shot magazine; 24" barrel; weight 7.75 lbs.



Winchester post-'64 Model 70 Featherweight rifle. Calibers on the standard action: 270 Win., 280 Rem., 30-06, 7mm Rem. Mag., 300 Win. Mag.; on the short action: 22-250, 223, 243, 6.5x55, 7mm-08 and 308. The rifle has a 22" tapered Featherweight barrel, American walnut stock, fancy checkering, schnabel on forearm tip and red rubber buttpad. Weight 6.75 lbs. (standard action) or 6.50 lbs. (short action).



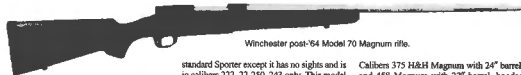
Winchester post-'64 Model 70 XTR rifle. About the same as the Post-'64 Model 70 except it has a high-gloss stock finish and differently shaped forend and pistol grip. 24" barrel, weight 7.75 lbs.



Winchester post-'64 Model 70 Sporter DBM rifle. Calibers: made in 243, 270, 30-06, 7mm Rem. Mag., 300 Win. Mag., 24" barrel. Introduced in 1992.



Winchester post-'64 Model 70 Stainless rifle. Same as the Model 70 Sporter except it has a stainless steel barrel and action with matte gray finish, black composite stock impregnated with fiberglass and graphite, contoured rubber recoil pad. Made in calibers 270, 30-06, 7mm Rem. Mag., 300 Win. Mag., 338 Win. Mag., 24" barrel, 3-or 5-shot magazine. Weight 6.75 lbs. Introduced in 1992.



Winchester post-'64 Model 70 Magnum rifle.

ber buttpad and satin finish, 22" barrel fitted with a hooded bead front sight on a ramp and a folding leaf rear sight, weight 7.75 pounds, sling swivel studs, and in calibers 270 and 30-06.

M70 XTR Magnum Sporter—Same as above except in calibers 264 Magnum, 7mm Magnum, 300 Magnum and 338 Magnum.

M70 XTR Varmint Sporter—Same as

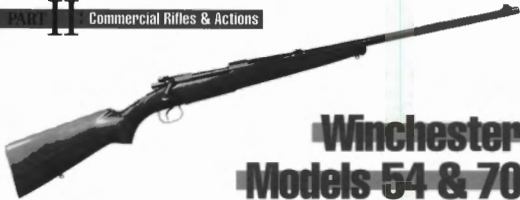
standard Sporter except it has no sights and is in calibers 222, 22-250, 243 only. This model replaces the former M70 Varmint rifle which has a medium-heavy barrel.

M70 XTR Featherweight—Classic-styled walnut stock with slim schnabell forend, rubber buttpad, detachable sling swivels, cut checkering and satin finish, 22" lightweight barrel with open sight optional, weight 6.75 pounds, and in calibers 243, 257 Roberts, 7x57mm, 270, 308 and 30-06.

M70 XTR Super Express Magnum—

Calibers 375 H&H Magnum with 24" barrel, and 458 Magnum with 22" barrel, hooded ramp front and open rear sights, sling swivel on barrel, walnut stock with raised comb and cheekpiece, rubber buttpad, weight 8.75 pounds.

M70 Westerner—Same as M70 XTR Sporter except does not have XTR finish or checkering, with 22" barrel and open sights in calibers 243, 270 and 30-06, and with 24" barrel in calibers 7mm Magnum and 300 Magnum.



Winchester Models 54 & 70

Part I

WINCHESTER offered their first high-power bolt-action rifles in 1925 with the introduction of the Model 54. The action of this rifle was entirely new for Winchester, for they had never before built anything like it—the closest things to it they had ever made were the Pattera 14 and Model 1917 Enfield actions. Rather than being an entirely new action design, the bolt and receiver of the M54 had features copied from the M98 Mauser and 1903 Springfield actions, though the magazine, trigger, and a few other things were new. Some new and improved design features were also added later on.

Before the M54 was discontinued in 1936 (after about 50,145 had been made), with the introduction of the Model 70 Winchester, several different styles of rifles were made on the M54 action.

There was the standard sporting rifle with 24" barrel, weight about 7.75 pounds. It had a lightweight stock reminiscent of a skinny German-style sporter stock, complete with a schnabel forend tip but without the cheekpiece. There was also a carbine model with 20" barrel. Around 1932 some changes were made in the action, and a fuller stock was introduced, called the NRA Model, along with new calibers and styles. Besides the standard sporter and the carbine, there was also a Super Grade added, plus a Sniper's Model, National Match Model and a Target Model. The following chamberings were offered in the M54 rifles (though not in all models): 22 Hornet (added in 1933), 220 Swift in 1935, 250-3000 in 1931, 257 Roberts in 1936, 7mm Mauser in 1930, 30-30 in 1928, 30-06 7.65mm Mauser in 1930, and the 9mm Mauser in 1936. The M54 was chambered originally in 30-06 and 270.

The Action

The one-piece receiver was made from a solid block of high tensile strength steel, carefully and precisely machined and properly heat treated to assure maximum strength and safety. The barrel is securely threaded (right-hand V-type threads) into the front of the receiver. The face of the barrel is fluted like that of the 1903

Springfield, and the right side notched for the extractor hook. The top of the receiver ring is round, its bottom flat, and a large integral recoil lug is on the forward edge. This lug, 1.175" wide by .435" deep, has more than ample area to transfer the recoil adequately to the stock without set-back of the receiver.

The bottom center of the receiver is cut away for the magazine opening. Integral cartridge guide-lips are left in each side of the well to hold and direct cartridges from the magazine into the chamber. Additional metal is left on the bottom of the receiver to form a receptacle for the magazine box. This extra metal strengthens the center of the receiver, making it very rigid.

The unlotted receiver bridge is about 1.5" long, has the same side contour as the receiver ring, but is slightly flattened on top, with a shallow matted groove cut lengthwise in it. Between the bridge and the ring, the left wall lies about 1/8" below the height of the receiver ring; the right wall is cut down to the level of the right locking lug raceway, thus offering an ample receiver opening for loading and ejection. Yet plenty of metal is left in the walls to keep the receiver strong. The bored-out receiver ends in a rounded tang much like that of the 1903 Springfield receiver.

The bolt is of one-piece construction, its solid dual opposed locking lugs on the forward end engaging behind shoulders milled inside the ring. The bolt head is partially recessed for the cartridge rim, the recess cut away at the bottom to allow a cartridge to slip under the extractor hook as it is fed from the magazine. This feature prevents double loading.

The integral bolt handle is at the extreme rear of the bolt body. The square base of the handle projects straight out to the right. The square-to-round tapered bolt handle stem, bent down and swept back, has a pear-shaped grasping knob. A notch is cut into the receiver tang, into which the lower part of the bolt handle base fits. This provides the third or safety lug for the bolt.

A cam lug on the rear of the bolt, extending to the left of the bolt handle base, matches a

cam surface milled in the left of the receiver bridge. They provide the initial camming power to the extractor when the bolt handle is raised.

On the top center of the bolt body there is a flat-sided lug or projection. When the bolt handle is raised to open the action, the flat side of this lug contacts the bottom edge of the left locking lug raceway. This lug not only acts to stop the opening rotational movement of the bolt, but also serves as a bolt guide when the bolt is operated.

The non-rotating extractor, of Mauser type, is attached to the bolt with a collar. It has a plug which engages in a groove cut into the bolt head, this preventing longitudinal movement on the bolt. The extractor hook is quite heavy, and its forward face is well-beveled so it can easily snap over the rim of a cartridge placed in the chamber ahead of it.

The bolt sleeve threads into the rear of the bolt body, and the threads are square. A small spring and plunger, fitted into the left front edge of the bolt sleeve, lock the bolt sleeve to the bolt to prevent the firing mechanism from turning when the bolt is opened. A small cross pin retains the lock plunger in place. This bolt-sleeve lock system is copied from the 1903 Springfield action.

The wing safety, of common Mauser type, fits into the top of the bolt sleeve. The wing engages a ridge on the bolt sleeve, with a notch cut into the top of the ridge so the safety can be removed after the striker is removed. The stem of the safety, on which the safety rotates, extends forward out of the bolt sleeve to engage a notch cut into the rear of the bolt body when it is to the right, and in the Safe or On position when swung to the left. The striker only is locked when the safety is straight up, while both striker and bolt are locked when the safety is in the On position. On "improved" 54s a small spring and plunger in the bolt sleeve engages the safety, and the wing of the safety is marked Fire on one side and Safe on the other.

(Above) Early Model 54 Winchester rifle.

PART II: Commercial Rifles & Actions



Model 54 Winchester action.

The bolt is drilled from the rear to accept the one-piece firing pin and coil mainspring. The cocking cam is permanently attached to the rear end of the firing pin. The firing pin extends through the bolt sleeve, and the mainspring is compressed over it between the bolt sleeve and a sleeve which locks in a groove on the front of the firing pin rod. The cocking cam extends into a notch in the rear of the bolt and, on raising the bolt handle, the firing pin is drawn back, to cock the action. On early 54s, the striker travel is about 1/2-inch. In 1932 a "speed-lock" was introduced, cutting this distance about in half. While the M54 was being made, and for a few years afterward, or for as long as parts were available, the early slow-lock could be converted to the speed-lock by replacing the following parts in the early action: sear, firing pin, bolt, mainspring and trigger. The late model also had a firing-pin stop screw in the bolt sleeve.

The sear, which also serves as the bolt-stop, is positioned in a recess under the rear of the receiver; it is held in place, and pivots on, a pin through the walls of this recess. The sear/bolt stop lug on the rear of the sear projects upward through a hole in the receiver to engage the cocking cam and bolt. Upward tension is supplied by a small spring between the receiver and the front of the sear. The trigger, hinged to the sear on a pin, has a double-stage let-off. The part of the sear which projects into the bolt well in the receiver engages the cocking cam when the action is opened and closed. Pulling the trigger pulls the sear down to release the striker. A flat and slightly inclined cut in the bottom of the bolt body, starting near its rear end, deepens toward the front of the bolt, where it ends in a hole in the bolt. As the bolt is pulled back, it slides over the projection on the sear, and the bolt is stopped when this projection contacts the edge of this hole. This inclined surface and hole are positioned at different spots under the bolt according to the length of the cartridge the action is made for, limiting the bolt travel to no longer than needed. On the bolt made for such long cartridges as the 30-06 and 270, the "stop" hole is near the front half of

the bolt, while for the 22 Hornet it is closer to the rear of the bolt. In any case, pulling the trigger back as far as it will go pulls the sear down so the bolt can be removed from the action.

The ejector, a flat piece of metal fitted in a narrow slot cut through the bottom right side of the bridge, is held in place by, and pivots on, a pin, its tension provided by a small coil spring. On opening the bolt, the end of the ejector moves into a groove cut into the head of the bolt, ejecting the cartridges or empty cases upward to the right.

The M54 bolt has a single small gas-vent hole drilled into it at the firing pin tip junction. When the bolt is locked closed, this hole would direct any gases escaping through it into the left locking lug raceway. If more gases entered the bolt body through the firing pin hole than could be handled by this small hole, the bolt-stop hole would vent this gas, also into the left raceway. No gas-escape holes were made in the sides of the receiver ring. The bolt sleeve was not flanged enough to deflect any gases rushing rearward down the left raceway, but it sealed this raceway well enough so the gases would be vented out of the thumb notch cut into the top raceway wall, just ahead of the bridge.

The M54 magazine box was of heavy sheet metal, bent into a rough rectangle to fit the magazine opening in the bottom of the receiver. Magazine boxes for edges shorter than the 30-06 and 270 were blocked off with

a vertical sheet-metal spacer crimped in place in the rear of the box. These spacers varied in size according to the cartridges used. Magazines made for the 220 Swift and 30-30 cartridges had slanted spacers at rear and front, these to prevent the cartridge rims from overlapping.

The steel followers were made with a ridge on the top left to stagger the cartridges. Different lengths of followers were used for the different magazines. The W-shaped follower spring was held in mortises in the bottom of the follower and in the top of the trigger guard, which formed the magazine cover. Different sizes of follower springs were also made.

The trigger guard, formed from heavy sheet metal, is combined with the magazine cover or floorplate. A separate plate is inletted into the bottom of the stock, through which the trigger projects, with the guard partially inletted into the stock over this plate and magazine box. Three screws, running through holes in the trigger guard and stock, and threaded into the receiver, hold the barrel and action securely in the stock.

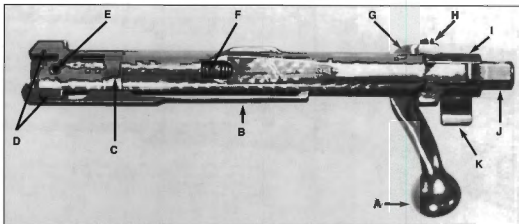
The 22 Hornet chambering was offered first in the M54 in 1933. Considerable changes had to be made so this big bolt action could handle the little Hornet. A special small magazine box, designed to fit inside the regular box, held 5 cartridges in a staggered column. It had a lip or feed chute, extending well forward, which guided the small cartridge into the chamber. The follower spring of the non-detachable Hornet magazine was made of spring wire, the follower of sheet metal. Loading was done from the top. The head of the 22 Hornet bolt is tapered to fit the funnel in the barrel. A small spring-activated lever, pivoted in a slot in the bottom of the bolt head, pushed the cartridges out of the magazine. The ejectors for Hornet rifles were riveted to the side of the outside magazine box but otherwise functioned just like the regular ejector.

Good and Poor Features

After the M54 rifle had been on the market a few years, the general consensus of both experts and shooters was favorable on practi-



Model 54 Winchester action open.



Underside view of the M54 Winchester bolt showing: (A) pear-shaped bolt handle grasping ball, (B) Mauser-type extractor, (C) extractor collar, (D) dual opposed locking lugs, (E) gas vent hole, (F) bolt-stop hole, through which can be seen the firing-pin sleeve and main spring, (G) extractor cam, (H) bolt-sleeve lock, (I) bolt sleeve, (J) cocking piece, (K) safety.

cally every count. Some corrections and changes were made, along with new styles, so that by 1932 it was considered a very-well-made and reliable rifle. Total production of a little over 50,000 units in the 11 years it was on the market indicate that it was not an overly popular rifle, but it must be remembered that there was a depression during much of this time. The M54 was a good "trial" rifle for Winchester, and by the mid-1930s they knew exactly what shooters wanted when they were ready to drop the M54 for a new model.

Here are some of the outstanding good features of the M54 Winchester action. It was a very strong action, its receiver and bolt made of the best steel available and properly heat treated; the breeching system was good; the bolt locking lugs are large and neither one was slotted; the bridge was long enough to guide and support the bolt during operation of the action. No one could ask for a better extractor, and the ejector system proved very good. Design and construction of the firing pin, bolt sleeve and bolt-sleeve lock and magazine were also very good. These good features, however, did not make up for many poor ones.

The poor features were: the contour of the bolt handle was so high it interfered with mounting a scope low over the receiver; the same was true of the safety, which was not convenient to operate either—even if the scope were mounted high enough to clear it; the bolt-stop system was far from good; too much strain was put on the rear if the bolt was operated with any force. Being combined with the rear also limited the trigger to the conventional military-type double pull. Lastly, the sheet-metal trigger guard did not belong on a modern rifle. I could

elaborate on these faults, but I suggest you read Part II of this chapter and learn what Winchester did to correct them in the Model 70 action.

Garnering the M54

Model 54 owners almost immediately, in many cases, began sending them to custom gunsmiths for rebuilding or restocking. Griffin & Howe got their share, a firm that really knew what to do to make them into those superb sporting arms and which made the name G&H so well known. Their specialty was restocking, and their classic stock on this rifle did great things for it. Winchester more or less copied the Griffin & Howe classic stock for the Super Grade 54 and, later on, for the Super Grade 70. If the owner wanted a scope on his M54, G&H would alter or install a new low safety, alter the bolt handle to a lower profile, and tap the receiver for their fine double-lever side mount.

Buehler still makes a low scope safety for the old 54 Winchester. Nothing much can be done with the original trigger to modify it. No one makes a milled steel trigger guard for this action, with or without a hinged floorplate. Although I've never done it, in restocking the M54 the M70 trigger guard and hinged floorplate can be used. This would require drilling and tapping a hole for the front guard screw in the bottom flat of the receiver ring.

The M54 in 30-30 caliber was not very popular, so not many were made. It was soon discovered that these 30-30 rifles were suitable for rechambering to the 30-40 Krag cartridge, and no doubt a lot of these rifles were so rechambered. About the same time, a number of wildcat cartridges based on the rimmed 219 Zipper, 30-30 and 30-40 cases became

popular, and the 30-30 M54 action was used for building rifles for these.

Many M54 rifles in 22 Hornet caliber were also rechambered to the 22 K-Hornet, or converted to handle the 22 R-2 Lovell cartridge, which were extremely popular among wildcatters in the 1930s. Griffin & Howe was one of the first shops to specialize in the conversion to the Lovell cartridge and, later on, to the 222 Remington cartridge. Properly done, these conversions worked out well.

Markings

The M54 Winchester serial number is stamped on the right side of the receiver ring. A letter at the end of the serial number indicates a minor change in the mechanism.

The Winchester trademark is stamped on the left receiver wall, thus:

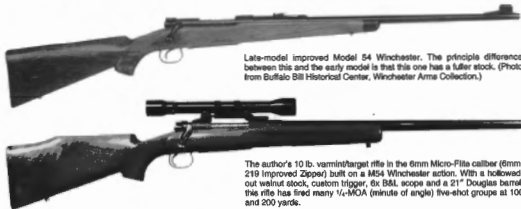
WINCHESTER
—TRADEMARK—

The Winchester firm name and address, model designation and caliber are stamped on the barrel. The Winchester proof mark (Pw within an oval) is stamped on the breech end of the barrel and on the receiver ring. The year of manufacture is often stamped under the barrel, such 34 indicating 1934.

Comments

M54 rifles in original and very good condition are becoming prized collector items. This is especially true for models other than the standard grade sporter, and for any of them in calibers other than 30-06 and 270. Because of this, the owner of one of these rifles should take this fact into consideration before altering

PART II: Commercial Rifles & Actions



Late-model improved Model 54 Winchester. The principle difference between this and the early model is that this one has a fuller stock. (Photo from Buffalo Bill Historical Center, Winchester Arms Collection.)

The author's 10 lb. varmint/target rifle in the 6mm Micro-Flita caliber (6mm-219 Improved Zipper) built on a M54 Winchester action. With a hollowed-out walnut stock, custom trigger, 6x B&L scope and a 21" Douglas barrel, this rifle has fired many 1/4-MOA (minute of angle) five-shot groups at 100 and 200 yards.

it in any way, since any changes may affect its future value. Those rifles already altered in some way generally have little collector's value. M54 parts are no longer factory available, so those rifles already altered cannot be readily restored to original condition. Even if you are willing to pay the price of a new M70 for an M54, locating one is going to be difficult since there just don't seem to be many around for sale. Separate M54 actions were never commercially available.

Operation

To load: place the safety in the intermediate (up) or Off (left) position; raise the bolt handle and pull the bolt back as far as it will go; place a single cartridge, bullet point forward, in the magazine opening and press it into the magazine in the same manner until the magazine is full. If desired, a cartridge can now be dropped into the chamber; press down the cartridges in the magazine so the bolt can be pushed forward over them; close the bolt fully and turn the bolt handle down as far as it will go to lock the cartridge in the chamber. With

the safety swung to the left, the rifle is ready to be fired by pulling the trigger. If the rifle is to be carried loaded, swing the safety to the right, or Safe position, which locks the striker and bolt. After firing, raise the bolt handle and pull the bolt back smartly to extract and eject the empty cartridge case. Push the bolt forward to move the topmost cartridge in the magazine into the chamber and, on lowering the bolt handle, the rifle is ready to be fired again. To unload, place the safety in the intermediate (up) position and move the bolt fully forward and back, until all the cartridges have been ejected from the action.

Takedown and Assembly

First, make sure magazine and chamber are empty. To remove the bolt, place the safety in the intermediate position, raise the bolt handle and pull it back while holding the trigger back as far as it will go; the bolt can now be removed. Remove the firing mechanism by depressing the bolt-sleeve lock on its left, and turning the bolt sleeve counterclockwise out of the bolt. To disassemble the firing mechanism, remove the firing-pin stop screw from

the bolt sleeve, place the firing-pin tip on a hardwood surface and, with a firm grasp on the bolt sleeve, push the bolt sleeve down so the safety can be swung to the right to allow the firing pin to move forward. Now grasp the firing-pin sleeve, pull it back so it can be rotated and released from the firing pin. The firing pin can now be pulled from the bolt sleeve. Swing the safety up and it can be removed. Drive out the very small bolt-sleeve lock pin to remove the bolt-sleeve lock and spring. Reassemble in reverse order.

Turn out and remove the three trigger guard screws and the guard (with follower spring and follower attached), and the barreled action can be lifted from the stock. Slip the follower off the follower spring and the spring off the guard. In reassembling, the narrow end of the spring goes into the follower. Push the magazine box upward out of the stock. Drive out the rear pin and remove the rear, rear spring and trigger. Drive out the ejector pin to remove the ejector and ejector spring. Reassemble in reverse order. The barrel, threaded very tightly into the receiver, should not be removed unless the proper tools are available (barrel vise and action wrench).

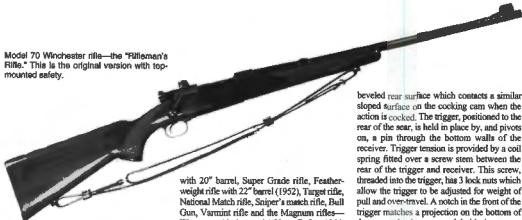
Dimensional Action Specifications

Weight	..... (approx.) 45 oz.
Receiver length	..... 8.750"
Receiver ring diameter	..... 1.340"
Bolt diameter	..... .695"
Bolt travel:	
Early model	..... 500"
Speedlock model	..... .350"
Magazine length	..... 3.385"
(spacers provided for cartridges shorter than standard .30-06)	
Bolt-face recess: Diameter	..... .513"
Standard calibers	..... .485"
.30-30 caliber	..... .513"
.22 Hornet	..... .367"
Depth	..... .045"
Guard-screw spacing	..... 8.25"

General Specifications

Type	..... Turnbolt repeater.
Receiver	..... One-piece machined steel forging. Non-slotted bridge.
Bolt	..... One-piece, with dual opposed forward locking lugs. Handle action as safety lug.
Ignition	..... One-piece firing pin with integral cocking-cam head. Cocks on opening.
Magazine	..... Non-detachable staggered-column five-shot box.
Trigger	..... Non-adjustable double-stage military type pull.
Safety	..... Rotary type positioned in the bolt sleeve, 180° swing; locks firing pin when up, and is in Fire position when swung to the right.
Extractor	..... Non-rotating one-piece Mauser-type spring extractor fastened to the bolt by a collar.
Magazine cut-off	..... None provided.
Bolt-stop	..... Sear acts as the bolt-stop, engaging a cut in the bottom of the bolt.
Ejector	..... Pivoting type, positioned in a groove in the rear of the receiver.

Model 70 Winchester rifle—the "Rifleman's Rifle." This is the original version with top-mounted safety.



Part II

Pre-'64 Model 70 Winchester

BY THE EARLY 1930s, Winchester had begun quietly to develop a new and improved successor to the M54 action, but retaining the best features of the 54. New design features would eliminate the faulty and undesirable aspects. By 1934, Winchester's designers had the new action worked out and ready for manufacture. Because of the Depression, perhaps, they decided to postpone its introduction until late 1936—although Winchester generally gave 1937 as the date of introduction. The new rifle was called the Model 70. As almost every high-power rifle shooter knows, the M70 was an instant success. In time it became known as the "Rifleman's Rifle." This very apt title reflects what most shooters and experts thought about it.

In 1964, some basic changes were made, and from that time on all Model 70s made between 1936-1964 are known as "old M70s," and are generally referred to as pre-'64 70s. The M70 rifles and actions discussed in this part are those made before 1964.

Like the M54, the M70 was made in a number of styles and calibers, though not all of the various styles were chambered for all the cartridges in the following list: 22 Hornet, 225 (1964), 220 Swift, 243 (introduced 1955), 250-3000 Savage, 257 Roberts, 264 Magnum (1959), 270, 7mm Mauser, 300 Savage, 30-06, 308 (7.62mm NATO) in 1952, 300 H&H Magnum, 300 Winchester Magnum (1963), 338 Magnum (1958), 35 Remington, 358 Winchester (1955), 375 H&H Magnum, and 458 Winchester Magnum (1956). A few M70 rifles were also chambered for the 7.65mm and 9mm Mauser cartridge.

The following different styles were made: Standard rifle with 24" barrel, Standard carbine

with 20" barrel, Super Grade rifle, Feather-weight rifle with 22" barrel (1952), Target rifle, National Match rifle, Sniper's match rifle, Bull Gun, Varmint rifle and the Magnum rifles—Westerner, Alaskan and African. Before 1964, M70 actions and barreled actions were never commercially available.

The M70 Action

The M70 was not really an entirely new action when it was introduced, but rather the basic M54 action redesigned and greatly improved and modified.

Winchester made five major changes on the M54 action to transform it into the M70.

1) Bolt-stop: a separate and independent bolt-stop is used in the M70 action. It is a flat piece of metal positioned in a slot milled into the left rear of the receiver through the bottom of the left locking lug raceway. It is held in place by, and pivots on, the trigger pin. Tension is provided by a small spring and plunger located at the left rear of the bridge. The rear of the bolt-stop projects upward behind the bridge wall, where it can be depressed with the thumb to remove the bolt. The front end of the bolt-stop projects up into the left locking lug raceway, halting the bolt in its rearward movement by contacting the locking lug. To limit bolt travel in actions made for cartridges shorter than the 30-06, a bar is fitted to the left of the extractor collar. This bar slides in the locking lug raceway, its front end contacting the locking lug when the bolt handle is raised. On opening the bolt, the bolt-stop will contact the rear end of this bar and halt the bolt travel. A short bar (called the bolt-stop extension) is used for the 220 Swift- to 308-length cartridges, a slightly longer bar for the 250 and 35 Remington cartridges, and the longest bar for the 22 Hornet. The bolt-stop is simple, strong, unobtrusive, convenient and easy to operate.

2) Trigger: the M70 has one of the best trigger systems ever made. The sear is located under the receiver in the same manner as the M54 sear, pivoting on a pin and tensioned by a coil spring. The rear part of the sear, which projects into the cocking cam raceway, has a

beveled rear surface which contacts a similar sloped surface on the cocking cam when the action is cocked. The trigger, positioned to the rear of the sear, is held in place by, and pivots on, a pin through the bottom walls of the receiver. Trigger tension is provided by a coil spring fitted over a screw stem between the rear of the trigger and receiver. This screw, threaded into the trigger, has 3 lock nuts which allow the trigger to be adjusted for weight of pull and over-travel. A notch in the front of the trigger matches a projection on the bottom of the sear and, when engaged, holds the sear up against the cocking piece to hold the firing pin back when the action is cocked. The arrangement and the leverages are such that a full sear-to-cocking piece engagement is maintained, yet there is a minimum engagement between the trigger and sear, thus achieving a safe, but short and light, trigger let-off. The mechanism is very simple, strong, reliable and foolproof.

Properly adjusted, no shooter need complain about this trigger. It is still being used on all M70s.

3) Safety: the M70 safety is built into the bolt sleeve, its stem fitting into a vertical hole in the right side of the bolt sleeve. Held in place by a small cross pin through the bolt sleeve, it is tensioned by a spring and plunger positioned lengthwise in the top of the bolt sleeve. The hole for this plunger extends forward through the bolt sleeve in line with the rear of the bolt and, when the safety is swung to the Safe position, the plunger is moved forward to engage in a notch in the bolt, locking it. The two main positions of the safety are Safe and Fire, but it can also be placed midway between these positions. When on Safe, the stem of the safety engages the cocking piece, locking both firing pin and bolt. With the safety in the intermediate position the bolt can be operated to unload the magazine, with no danger of the firing pin falling.

On the first M70 actions the safety wing was on top of the bolt sleeve, swinging over a flat surface thereon. Swung far left, the safety is in the Safe position; swung to the rear it is in the Fire position. This safety was not convenient when a scope was mounted low over the receiver. A new safety, designed later, has a wing along the right side of the bolt sleeve that is easy to operate under any condition; it is in the Safe position when swung to the rear, and in the Fire position when swung forward. This fully reliable safety is still being used on the M70 actions.



Original Model 70 Winchester action.

4) Bolt handle: the M70 bolt handle, made to a very low profile, will clear the eyepiece of the lowest-mounted scope that might be affixed. The tang of the receiver is deeply notched to accept the very heavy base of the bolt handle and, though the rear of the base does not contact the rear of the notch, it serves as a safety lug in the event the locking lugs or receiver ring should ever fail. Failure of the receiver, however, is highly unlikely.

5) Magazine: the M70 magazine box, follower and follower spring are the same as those used in the M54, but rather than using a piece of bent sheet metal for the trigger guard and magazine cover, the M70 has a hinged magazine floorplate and guard milled from steel. The separate guard bow is of steel also. Screws at either end of the guard thread into the bottom of the receiver. An unobtrusive plunger catch is positioned in the front of the guard to hold the floorplate closed; it is depressed to release the floorplate (also milled from steel), which is neatly hinged to a short plate called the magazine cover plate. The front guard screw goes through this plate into the bottom of the receiver ring. When the floorplate is closed, it covers a center guard screw as well as covering the entire magazine box. On the Featherweight M70, the guard bow, floorplate and hinge plate were made of an aluminum alloy.

The five major changes just described greatly improved the action.

By making a separate bolt-stop system, the extra machining required on the M54 bolt was eliminated. The lower profile of the bolt handle increased the strength of the safety lug it provided. Placing the front guard screw to the rear of the receiver ring, instead of threading it into the recoil lug, strengthened the wood which supported the lug since this wood is

clamped between the bottom of the receiver and the hinge plate.

The receiver, bolt, breeching system, extractor, ejector and firing mechanism proved so reliable in the M54 that hardly any design changes were made in these parts or mechanisms. The M70 receiver is the same length and diameter, and about the same weight, as the M54 receiver. The M70 receiver was always tapped on the left side for a receiver sight. When the rifle was first brought out, only the top of the receiver ring was tapped for a scope mount, but soon afterward the top of the bridge was also tapped. The same barrel shank and thread specifications were used, and in fact, M54 and M70 barrels are interchangeable. No change was made in the bolt locking arrangement. The same is true of the firing pin, mainspring and firing-pin sleeve. Both models have the same bolt sleeve lock and, except for the modifications for the different safeties used, even the bolt sleeves are similar. In fact, all of these parts are more or less interchangeable in the M54 and M70 actions. The M70 bolt has the same rotational stop lug as on the M54, and the same extractor cam.

Additional gas-vent holes are provided in the M70 bolt and receiver—two in the bolt, a small one near the bolt head, at the junction of the firing pin tip, and a larger one just ahead of the firing-pin sleeve. These allow gases to escape into the left locking lug raceway. If any gas should be expelled into the bolt, and thence into the locking lug raceway, it would flow between and past the bolt body and receiver, as well as being directed rearward down the raceway. The bolt-stop and the bolt sleeve could partially stop this flow, but some gas could still escape past the edge of the bolt sleeve and strike the shooter's face. On the M70 rifles

chambered for the shorter cartridges (those having a bolt-stop extension bar on the extractor collar), the extension bar would cover one or both of the bolt gas-vent holes.

A gas-escape hole through the right side of the M70 receiver ring, opposite the extractor slot in the barrel, allowed any powder gases escaping to the right to be vented through this hole. More on this later.

Only one size receiver and bolt were used for all calibers in the M70 Winchester and, regardless of caliber, all actions were of the same length. Actions made for the 30-06 and 270 have a magazine box with an inside opening length of 3.385", with the magazine well in the receiver just long enough to receive the magazine box. For cartridges of shorter length, such as the 257 Roberts, 243 and others, the rear of the magazine box is blocked off with a spacer, so the magazine box opening is no longer than needed. Shorter followers and follower springs are then used. The 22 Hornet M70 has a magazine arrangement just like that of the M54 previously described. Model 70 actions made for the long 300 H&H and 375 H&H Magnum calibers have the magazine-well lengthened and the magazine box, follower and spring made accordingly to accept these 3.60"-long cartridges. Regardless of the caliber they were made for, however, M70 receivers were all of the same length.

Early M70 receivers made for such standard calibers as the 30-06 and 270 had a stripper-clip guide milled into the bridge so that cartridges could be loaded from a clip. This feature was dropped later except in the target rifles.

The Featherweight M70

Up to 1952 all M70 actions were of all-steel construction—and of all milled-steel construction except for such parts as the sheet-steel

Left side of the pre-'64 M70 Winchester action showing the bolt open.



magazine box and springs. In 1952, however, the M70 Featherweight rifle was introduced in response to the demand for lighter rifles. The weight reduction was achieved by using a very slim 22" barrel, a trimmer and slimmer stock having an aluminum buttplate, and by making the trigger guard, floorplate and hinge plate of a lightweight aluminum alloy. The grasping ball was also hollowed out. The standard-weight M70, with all-steel parts, was retained until both it and the Featherweight models were dropped in 1964 in favor of a newer New Model 70, to be described later.

Except for the three aluminum parts, which made the action a few ounces lighter (these parts were black anodized), the Featherweight action was identical to the standard all-steel action. While many hunters favored the Featherweight model over the standard model, most M70 rifle fans disapproved of the use of non-steel parts, feeling the rifle was "cheesepened" thereby. In fact, the anodized finish given these parts did not wear well, and if the rifle was carried a lot, the floorplate soon became bright. Also, if bumped hard, the aluminum guard could be easily broken.

Good and Poor Features

Winchester rifle fans, and particularly Winchester 70 fans—and they are legion—stoutly maintain that the pre-1964 M70 action is the best centerfire bolt action ever made, that it has no faults, and that it cannot be improved upon. I'll go along with this up to a certain point.

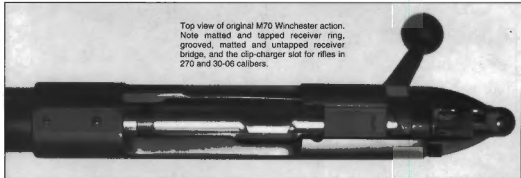
The M70 action as made before 1964 really has a lot of outstanding features which make it one of the finest, most reliable and strongest bolt actions ever made. In the first place, it is made of the finest steels available for the purpose, and the various parts are heat treated for maximum strength and durability. It is extremely well made, with all vital parts made to close tolerances and properly finished and fitted. It is easy to operate, and feeding is usually flawless. The M70 action was adopted by a number of wildcat cartridge experimenters for development work with large-capacity cartridges, and the actions stood up under this punishment, attesting to their strength.

As mentioned previously, the firing mechanism, which includes the trigger, is nearly flawless, and hardly any valid complaints can

be leveled against the bolt-stop, safety, ejector and extractor systems. The M70 has about the shortest striker travel and about the fastest lock time of any centerfire bolt action then made that I'm aware of, which are features target shooters like. As well known as the M70 rifle has become in the hunting field, it is equally a favorite on the target range.

The pre-'64 M70 action can also be considered very safe, but I feel that it could easily have been made safer. In discussions with several arms experts and shooters about this action, several of them said that, in case of a cartridge failure when the head of the cartridge cracks or splits, they would rather have been firing some other rifle when this happened than the M70. I have fired many thousands of shots using commercial, military and hand-loaded ammunition in a variety of centerfire bolt-action rifles, but I can recall only two instances of case failure. Both happened when I was firing a Mauser M98 rifle. In both instances a lot of gas blew out of the action, but (I was wearing glasses) hardly any of the gas hit my face. If these had been M54 or M70 rifles I would not have had the protection the

Top view of original M70 Winchester action. Note matted and tapped receiver ring, grooved, matted and untapped receiver bridge, and the clip-charger slot for rifles in 270 and 30-06 calibers.





The Model "B" Winchester M70 single shot action used by the Winchester testing laboratory as a pressure gun.

Mausers actions afforded me, with their flanged bolt sleeves. The point is, I would consider the M70 action much safer if it had a vent hole in the left side of the receiver in addition to the one in the right side of the receiver ring. I would also prefer to have a flange on the left side of the bolt sleeve, one which extended to the outside of the receiver to deflect outward any gases expelled rearward along the locking lug raceway. I would also want the hole in the left receiver wall opposite the vent hole in the bolt body, and I'd prefer to have both holes well forward, about $\frac{3}{4}$ " from the bolt head.

In one case reported to me by a gunsmith, whose statement I cannot question, a shooter

firing an M70 experienced a severe case-head rupture, probably through an overload or plugged bore. Most of the escaping gases were directed into the left locking lug raceway, and in such volume and force that the bolt-sleeve lock was blown out as the gases rushed past the bolt sleeve. The shooter was injured by the powder gases, but luckily the flying bolt-sleeve lock missed him. This one instance, at least, is enough to convince me that the M70 action would be safer if the bolt sleeve were flanged, and if there were a vent hole in the left side of the receiver.

I have experienced misfires with two M70 rifles I owned and used, but I never really

found out what the trouble was. In one rifle I suspected that the misfires were caused by the firing pin not being held back as far as is normal, because the sear-to-trigger surfaces had been honed too much. This resulted in the sear not being held up as high as normal, preventing the sear from holding the firing pin back as much as it should be. The difference was very small, since the safety could still be engaged with some effort, but the difference was enough, I think, to cause frequent misfires. For myself, I would rather have the firing pin travel on the M70 increased by $\frac{1}{16}$ " to provide an excess of power and momentum to the firing pin for positive ignition under all conditions.



The Model "B" action opened.

Gascutting

The M70 action is one that is seldom gunsmithed. It is, perhaps, the first action choice on which to build a custom sporter or target rifle, but no gunsmithing is necessary unless the caliber is changed, or something like that. In fitting a new barrel, it should be breeched up so there is some space between the bolt and barrel, leaving some .003" to .005" end play in the bolt. A hole can be drilled in the left receiver ring or wall to provide a gas-escape port on that side.

If you want a double-set trigger, it is possible to install the regular Gorman set-trigger mechanism as made for the M98 Mauser. Installation instructions can be found in the July, 1962, issue of *The American Rifleman*, p.37.

I have already mentioned the lack of any gas shield on the bolt sleeve of M70 rifle, old and new. On page 73 in the April, 1964, issue of *The American Rifleman*, instructions are given on how to install a simple Mauser-type gas shield on the M70 bolt sleeve. The outside of the bolt sleeve, just to the rear of its forward flared edge, is fitted with a shield made from a steel washer, silver soldered in place.

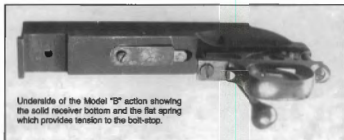
Takedown and Assembly (Pre-'64)

Make sure the chamber and magazine are unloaded. Open and close the bolt, place the safety in the intermediate position. To remove the bolt, raise the bolt handle and pull the bolt back about halfway, depress the bolt stop on the left rear of the receiver, then pull the bolt all the way out.

To disassemble the bolt, depress the bolt-sleeve lock plunger and unscrew the bolt



Top view of the M70 Model "B" action. Notice the absence of an extractor.



Underside of the Model "B" action showing the solid receiver bottom and the flat spring which provides tension to the bolt-stop.

sleeve and firing mechanism. Move the safety to the Fire position, allowing the firing pin to fall. Grasp the firing-pin sleeve firmly, pulling it back until it can be turned $\frac{1}{4}$ -turn in either direction, then ease it off gently against the strong mainspring pressure. The firing pin can be separated from the bolt sleeve by turning out the firing-pin stop screw from the bolt sleeve. To remove the extractor, turn it under the bolt so it covers the gas-vent holes, then push it forward. Reassemble in reverse order.

Do not remove the extractor collar unless absolutely necessary.

It is not advisable to remove the safety, but if it must be done proceed as follows: use a small drift punch to drive the safety retainer-pin to the inside of the bolt sleeve, then rotate the safety until it can be lifted out; the safety-lock plunger and spring can now be removed. Remove the bolt sleeve lock and spring by driving out the bolt-sleeve retainer pin. Reassemble in reverse order.



This pre-'64 M70 action is fitted with a Canjar fully adjustable trigger mechanism complets with single-set trigger shoe.

PART II: Commercial Rifles & Actions



This is the Featherweight M70 pre-'64 Winchester, one of the several different models built on this action. It weighs about 6.5 lbs. and has a slender 22" barrel, slimmed-down stock, aluminum alloy trigger guard and buttplate, and was in calibers 243, 264 Mag., 270, 308, 30-06 and 358.

Winchester M70s were so highly thought of that their owners often had them custom restocked with very fancy walnut, and elaborately checkered, like this one.

To remove the barrel and action from the stock, first turn out the front magazine-plate screw and remove the magazine floorplate and hinge plate. Turn out the forend screw. Turn out the rear and front guard-bow screws, then pull out the trigger guard bow. Lift the barrel and action out of the stock. Remove the magazine box from the stock. Reassemble in reverse order.

Remove the trigger and bolt-stop by driving the trigger pin to the right, removing the bolt-stop, bolt-stop plunger and plunger spring first, then drive the trigger pin all the way out to remove the trigger and trigger spring. Drive out the sear pin to remove the sear and sear spring, and drive out the ejector pin to remove the ejector and spring. Reassemble in reverse order.

The barrel is threaded very tightly into the receiver. It should not be removed unless absolutely necessary, and then only if a barrel vise and action wrench are available.

The floorplate can be separated from the hinge plate by driving out the hinge pin. The floorplate release can be removed from the guard by driving out the pin.

The follower can be slipped off the follower spring, and the spring slipped off the floorplate. In reassembling, the follower is slipped over the narrow end of the follower spring.

Markings

The M70 Winchester receiver is marked with the firm's special lettering for "Winchester" on the left wall in two lines, thus:

WINCHESTER
—TRADEMARK—

The serial number is stamped on the right side of the receiver ring and etched on the bottom of the bolt body.

The Winchester proof mark (P over W within a vertical oval) is stamped on the left

side of the receiver ring and on the left side of the barrel breech.

The name and address of the Winchester firm is stamped on the barrel forward of the rear sight. The model (MODEL 70) and caliber designations are also stamped on the barrel. The caliber is also stamped on the bottom of the barrel, near the breech, along with the year the rifle was made, thus: 270 42, which would indicate 270 caliber and 1942.

If you want a pre-'64 M70 action on which to build a rifle you'll have to strip a rifle to get it! In the 1940s and '50s it was no problem to pick up a moderately-priced secondhand M70 and discard all of it except the action. Since then these rifles are becoming hard to find, and they're often priced out of reach. Despite this—or maybe because of it—M70s are being hunted down and bought by those who think there is no other bolt action quite so desirable on which to build that dream rifle.

Target shooters seem to have a special preference for this action; I've read that one well-known gunsmith has built over a thousand target rifles on it. It will be hard for anyone to convince my son, Mark, who helped me with this book, that there is a better high-power target rifle action than the M70, for the rifle he used in 1966 to win the 1000-yard Leech Cup match at Camp Perry was built on one.

The Model 70 Single Shot Proving Action

Illustrated here is a pre-'64 Winchester Model 70 action about which little has been written. It is a special action made by Winchester to be used in their testing and development laboratories. It is made as a single shot and was probably used on test rifles, but most likely only as a pressure gun in developing and testing ammunition. Just how this particular action got into private hands I do not know, but it was shown me by a St. Louis collector.

This particular action is marked as follows; stamped on the left side of the receiver is:

WINCHESTER
TRADE MARK

On top of the receiver bridge is stamped:

MODEL "B"
102

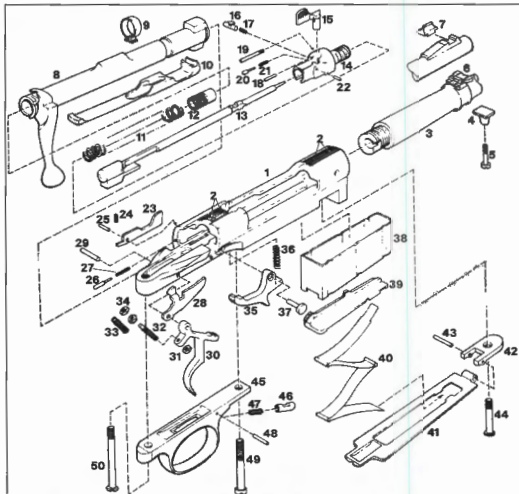
The 102 is the serial number.

There were several variations of this single shot action made, and the Model "B" is one of them. I have no idea how many of these actions were made, but they were not made for the commercial trade.

The "B" number 102 action shown here differs from a standard M70 action in a number of ways. First, it is a single shot. There is no magazine well opening in the receiver and no magazine box. There is also no ejector or extractor, and neither the bolt nor the receiver is machined to accept these parts. The bolt face is flat with no ejector cut. A special bolt-stop is used, and it is mounted on the bottom of the receiver to engage in a beveled notch in the bolt. Some metal has been removed from the front of the receiver for the installation of a special plate, which is used when the action is fitted to a pressure barrel. The square hole in the right side of the receiver ring provides an access for the insertion of a special tool to extract the fired cases from the pressure barrel.

The remainder of the action is more or less standard including the firing mechanism, trigger mechanism and trigger guard and magazine floorplate parts.

Do you want to know more about the Winchester Model 70, especially about the pre-'64 model? If so, then you should have the book, *The Rifleman's Rifle* by Roger C. Rule. It is a large volume solely devoted to the Model 70 Winchester. Whatever your interest in this Winchester rifle, this is a book you must get.



Parts Legend

- | | | |
|----------------------------------|----------------------------------|-------------------------------------|
| 1 Receiver | 18 Breechbolt Sleeve Lock Pin | 37 Sear Pin |
| 2 Receiver Plug Screws | 19 Firing Pin Stop Screw | 38 Magazine |
| 3 Barrel | 20 Safety Lock Plunger | 39 Magazine Follower |
| 4 Forearm Stud | 21 Safety Lock Plunger Spring | 40 Magazine Spring |
| 5 Forearm Stud Screw | 22 Safety Lock Stop Pin | 41 Magazine Cover |
| 6 Rear Sight Assembly | 23 Ejector | 42 Magazine Cover Hinge Plate |
| 7 Front Sight | 24 Ejector Spring | 43 Magazine Cover Hinge Pin |
| 8 Breechbolt | 25 Ejector Pin | 44 Magazine Cover Hinge Plate Screw |
| 9 Extractor Ring | 26 Bolt-stop Plunger | 45 Guard Bow |
| 10 Extractor | 27 Bolt-stop Plunger Spring | 46 Magazine Cover Catch |
| 11 Firing Pin Spring | 28 Bolt-stop | 47 Magazine Cover Catch Spring |
| 12 Firing Pin Sleeve | 29 Trigger Pin | 48 Magazine Cover Catch Pin |
| 13 Firing Pin | 30 Trigger | 49 Front Guard Bow Screw |
| 14 Breechbolt Sleeve | 31 Trigger Stop Screw Nut | 50 Rear Guard Bow Screw |
| 15 Safety Lock | 32 Trigger Stop Screw | |
| 16 Breechbolt Sleeve Lock | 33 Trigger Spring | |
| 17 Breechbolt Sleeve Lock Spring | 34 Trigger Spring Adjusting Nuts | |
| | 35 Sear | |
| | 36 Sear Spring | |

Parts Not Shown

- Buttplate
- Buttplate Screws
- Buttstock

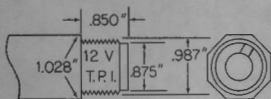
Part III

Reference

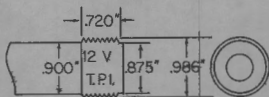
Reference

Barrel Shank Drawings	501
Appendix—Magazine/Guard Screw Sizes & Threads	511
Bibliography A— <i>American Rifleman</i> 1933-1995	512
Bibliography B— <i>Gun Digest</i> 1944-1996	521
Index	523

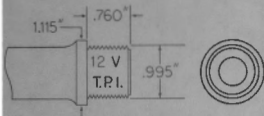
Barrel Shank Drawings



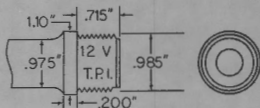
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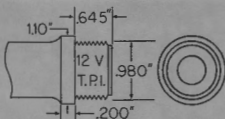
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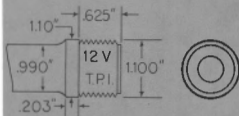
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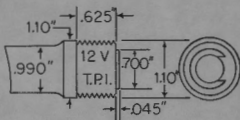
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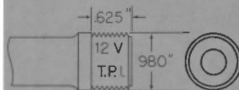
MODEL 93, 94, 95 & 96 MAUSER



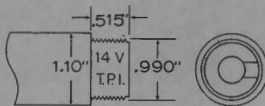
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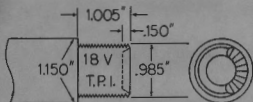
MODEL 24 YUGOSLAVIAN MAUSER
(M-98)



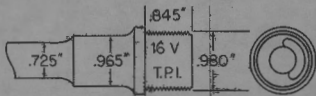
MAUSER G 33-40



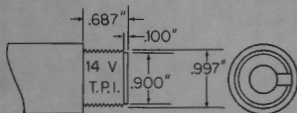
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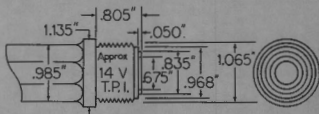
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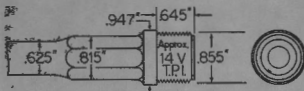
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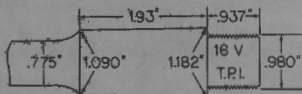
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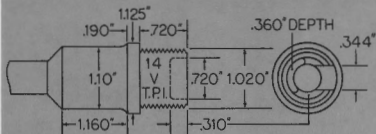
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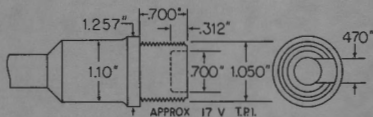
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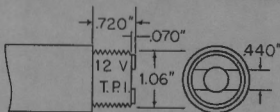
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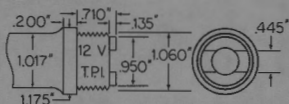
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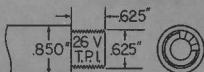
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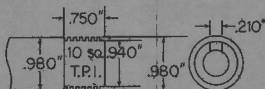
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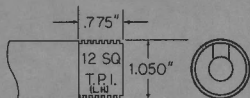
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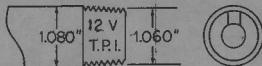
MODEL 1921 SPANISH
DESTROYER CARBINE



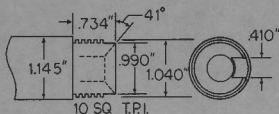
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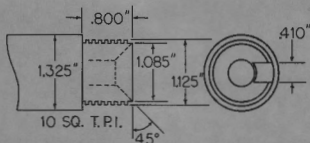
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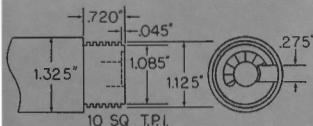
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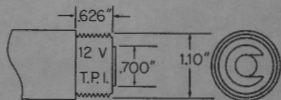
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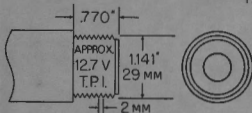
MODEL 30 30 S & 720 REMINGTON
MODEL 1917 ENFIELD



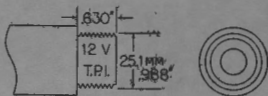
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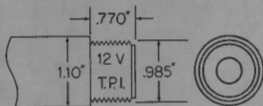
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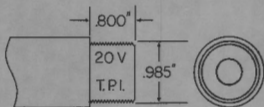
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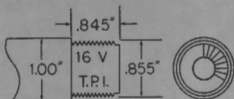
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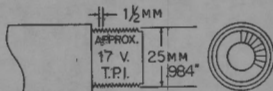
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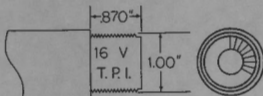
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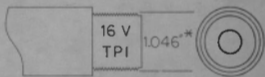
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SAKO L-57

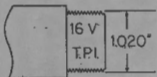


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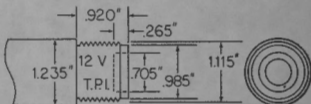


* EARLY MODELS 1.00"

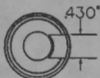
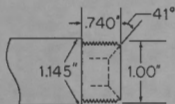
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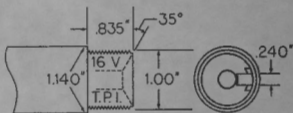


HERTERS (B.S.A) U-9 ACTION

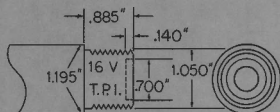


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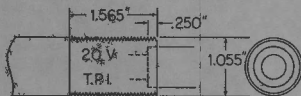
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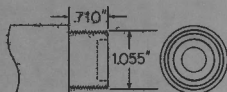
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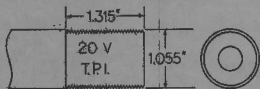
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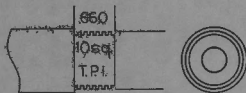
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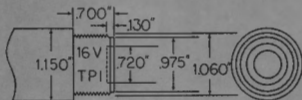
SAVAGE M-110
IF MADE FOR USE WITHOUT
LOCKNUT



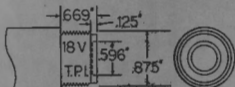
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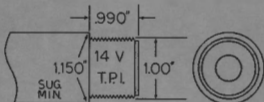
MATHIEU ACTION



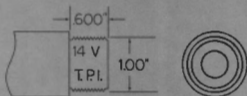
WEATHERBY MARK V MAGNUM



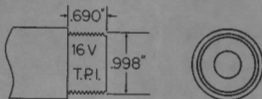
WEATHERBY MARK V
VARMINTMASTER



RANGER ARMS TEXAS MAGNUM



CHAMPLIN ACTION



RUGER M-77

Appendix

Magazine/Guard Screw Sizes & Threads (tap & die sizes)

Brevex Magnum Mauser	1/4x22	
British Lee-Enfield	1/4x26	
B.S.A. Monarch	1/4x27	
Centurion Mauser M98	1/4x22	
Champlin	1/4x28	
FN M98 Mauser	1/4x22	
French Berthier	15/64x26	
German M88 Commission	1/4x22	
German M98/40	275x26	
Greek Mannlicher/Schoenauer	1/4x27	
Herter's J9 and XK3 Mauser	1/4x22	
Herter's U9	1/4x27	
Husqvarna	230x26	
Husqvarna M8000	15/64x26	
Italian Carcano	1/4x25	
Japanese Arisaka Type 99	15/64x34	
Japanese Arisaka Type 38	228x28	
Mauser M71/84	1/4x22	(Tang Screw .7/32x28)
Mauser M91 Argentina	1/4x22	(Front guard screw)
Mauser M93 and M95	1/4x22	
Mauser M94 and M96 Swedish	1/4x22	
Mauser M98 (all models)	1/4x22	
Mathieu	1/4x28	
Pattern 14 Enfield	1/4x30	
Ranger Arms Texas Magnum	1/4x28	(Center screw .7/32x28)
Remington M721 and M722	1/4x28	(Center screw .5/32x36)
Remington M700	1/4x28	
Remington M788	1/4x28	(Rear screw .7/32x28)
Remington M30	1/4x30	
Ruger M77	1/4x28	(Rear & center screw .3/16x32)
Russian Mosin-Nagant	17/64x32	
Santa Barbara M98 Mauser	1/4x22	
Sako	15/64x28	
Savage M110	1/4x28	
Springfield, National Ordinance M1903A3	1/4x28	
Tradewinds M600	15/64x34	
U.S. Krag-Jorgensen	1/4x25	
U.S. M1903 Springfield	1/4x25	
U.S. M1917 Enfield	1/4x30	
Winchester M54	1/4x32	
Winchester M70 (all models)	1/4x32	

Bibliography A

Bibliography of articles pertaining to centerfire turnbolt rifles and actions which appeared in the *The American Rifleman* from 1933 through August, 1995.

ACTIONS

- "Brexit Magnum Mauser Action" - A Dope Bag Report, Dec., 1955, p. 63.
- "Featherweight Sporter" - A Dope Bag Report, June, 1959, p. 56. (Description of the little-known Terhaar centerfire turnbolt action.)
- "FN Mauser Bench-Rest Action" - A Dope Bag Report, Jan., 1956, p. 61.
- "HVA Improved Mauser Action" - A Dope Bag Report, April, 1954, p. 72.
- "Reinforced Action" - A Dope Bag Report, Oct., 1957, p. 66. (Describes an FN Mauser benchrest action fitted with a reinforcing sleeve.)
- "Shilen Actions" - A Dope Bag Report, April, 1962, p. 56. (Illustrating and describing the custom-made Shilen single shot benchrest turnbolt action.)
- "Texas Magnum Actions" - A Dope Bag Report, Aug., 1967, p. 58.

BROWNING RIFLES

- "Browning A-Bolt II" Aug., 1994, p. 50.
- "Browning A-Bolt" Oct., 1985, p. 50.
- "Browning Rifles" - A Dope Bag Report, Sept., 1960, p. 58. (Report on the Browning High-Power rifles based on a modified FN Mauser action.)
- "Browning Safari Grade Rifle" - A Dope Bag Report, June, 1965. (Evaluation and test results of the Browning Sako centerfire bolt-action rifle.)
- "Finding The 'Sweet Spot' of Accuracy" by Robert Hunnicutt, (Browning A-Bolt) Dec., 1993, p. 34.

B.S.A. RIFLES

- "B.S.A. Majestic" - A Dope Bag Report, Dec., 1959. (Describes the British-made BSA turnbolt sporting rifle.)
- "B.S.A. Monarch Deluxe Rifle" - A Dope Bag Report, Aug., 1965, p. 69.
- "B.S.A. Rifle" - A Dope Bag Report, July, 1956, p. 66. (Describes the medium-length BSA bolt-action sporter.)
- "B.S.A. Rifles" - A Dope Bag Report, Sept., 1957, p. 72. (Report on the BSA featherweight bolt-action sporter.)
- "B.S.A. Varmint Rifle" - A Dope Bag Report, Nov., 1954, p. 56. (Information on the BSA bolt-action rifle in 222 caliber.)

BULLPUP RIFLES

- "Building the Bull Pup Rifle" by L.H. Brown, May, 1953. (A noted gunsmith tells how to build a centerfire bolt-action bullpup rifle.)
- "Care and Feeding of Bull Pup" by A.H. Barr, April, 1950. (Much information and ideas on bullpup rifle designs, etc.)
- "New Trigger For a Pup" by A.H. Barr, Jan., 1943. (Describes a clever trigger system for a bullpup rifle.)

- "Spoon-Fed Bull Pup" by W. Doering, Dec., 1939. (Describes and illustrates a bullpup-type rifle built on the Model 1917 Enfield action.)
- "The Bull Pup Again" by M. Kennedy, Oct., 1954. (Dope on scooping, triggering and stocking a bullpup rifle.)
- "The One and Only Atomizer" by T.K. Lee, Jan., 1942. (Describes a bullpup-type rifle in 22 C.F. wildcat caliber.)

CARTRIDGES

- "7.7mm Japanese Ammo", June, 1985, p. 61.
- "7.55x55 Cartridge" (Schmidt-Rubin), Jun., 1991, p. 47.
- "Loads For the 25-06 Remington" by M.D. Waite and Kenneth C. Raynor, Nov., 1972, p. 20. (Tested loads for this popular cartridge.)
- "NATO/Warsaw Ammo", Oct., 1984, p. 60.
- "NRA loads For 308 Winchester" by M. D. Waite and K. C. Raynor, Oct., 1973, p. 47. (NRA-tested loads for this popular cartridge.)
- "The Hornet Still Stings" by Herman E. Arthur, Oct., 1975, p. 44. (Another look at the 22 Hornet.)
- "U.S. WWII Headstamps", May, 1988, p. 65.

COLT-SAUER RIFLES

- "Colt Sauer Rifle" - A Dope Bag Report, Nov., 1973, p. 60.
- "Colt Sauer Short-Action Rifle" - A Dope Bag Report, June, 1974, p. 45.

COMMERCIAL RIFLES (Miscellaneous Foreign)

- "Dickson-Howa Rifle" - A Dope Bag Report, July, 1967, p. 68. (Evaluation of the Japanese Golden Bear sporting rifle based on a copy of the Sako Fimbar action.)
- "F.I. Rifles" - A Dope Bag Report, March, 1963. (Evaluation of the Firearms International Musketier rifle based on the FN Mauser action.)
- "Ithaca A-55 Rifle" - A Dope Bag Report, Aug., 1969, p. 52. (Evaluation of the Finnish-made turnbolt sporting rifle.)
- "Parker-Hale Super" - A Dope Bag Report, July, 1968, p. 56. (Evaluation of the Parker-Hale big game sporting rifle based on a Spanish-made Mauser M98-type action.)
- "Smith & Wesson Rifles" - A Dope Bag Report, Oct., 1968, p. 92. (Describing the S&W high-powered rifles based on the Husqvarna turnbolt action.)

COMMERCIAL RIFLES (Miscellaneous U.S.)

- "Coltsman Rifles" - A Dope Bag Report, Nov., 1958, p. 72. (Test report on the Colt high-powered bolt-action rifle based on the Sako and FN Mauser actions.)
- "Fajen Acra Rifle" - A Dope Bag Report, Oct., 1969, p. 92. (Evaluation of the Fajen-stocked rifles built on the Santa Barbara Mauser barreled action.)

- "J.C. Higgins Rifle" - A Dope Bag Report, July, 1956, p. 72. (Describes the Higgins Model 52 bolt-action 222 rifle built on the Sako action.)
 "Mossberg Centerfire Rifle" by L. Olson, Aug., 1966. (Special report on the Mossberg Model 800 bolt-action rifle.)
 "New Marlin Varmint Rifle" - A Dope Bag Report, Sept., 1954. (Information on the Marlin Model 322 built on the Sako action.)

ENFIELD (M1814 & M1917)

- "A Glorified Enfield" by E. H. Whelan, Sept., 1934. (Short piece on remodeling the M1917 Enfield.)
 "A Remodeling Job on The '17" by L.K. Shaffer, Sept., 1937. (Short piece on remodeling the M1917 Enfield.)
 "An M17 and K43" by L.E. Capek, Oct., 1947. (Mounting a German sniper scope on the M1917 Enfield.)
 "Another Enfield Conversion" by J.H. Taber, June, 1948.
 "BSA-Enfield Rifle" - A Dope Bag Q&A, Nov., 1974, p. 56.
 "Cal. 276 Enfield Rifle" - A Dope Bag Q&A, Dec., 1972, p. 82.
 "Dope Bag Items" by F.C. Ness, May, 1938. (Describes a lightweight remodeled M1917 Enfield.)
 "Enfield Rear Sight Conversion" by A.W. Weiler, April, 1947. (How to put windage adjustment into the issue M1917 Enfield rear sight.)
 "Enfield Speed Lock" by R. Heidrich, Feb., 1948. (How to speed up the lock time of the M1917 Enfield.)
 "From Enfield to Sporter" by Ness, Lenz, Whelan, Linden, Dec., 1945, Jan. & Feb., 1946.
 "Hacksaw Gunsmithing" by J. Howell, May, 1949. (More gunsmithing dope on the M1917 Enfield.)
 "Kitchen Mechanic Remodeling" by H.V. Stent, Feb., 1947. (Remodeling the M1917 Enfield.)
 "M17 Knockabout" by L.E. Capek, Oct., 1946. (Describes an easy remodeling project on the M1917 Enfield.)
 "Making a Rifle Out of The '17" by A. Linden, May & June, 1933. (Excellent article on remodeling the M1917 Enfield into a sporter.)
 "Model 1917 Sporter" - A Dope Bag Report, Feb., 1946. (Notes on remodeling the M1917 Enfield.)
 "Mount For A German Scope" by H.S. White, Feb., 1951. (Mounting the German ZF-4 scope on the M1917 Enfield.)
 "Reliability of M1917 Enfield" - A Dope Bag Q&A, March, 1977, p. 53.
 "Remodeling the Enfield Rifle" by M.D. Waite, May, 1962.
 "Six-Hour Remodeling Job" by H.H. Hill, Jan., 1948. (Simple remodeling of the M1917 Enfield.)
 "The Big 450" by Hal Stephens, Sept., 1952. (About the 450 Magnum in the M1917 Enfield.)
 "The Ears Have It" by R. Stanley, April, 1947. (Mounting a scope on the "eared" M1917 Enfield action.)
 "The Model 1917: A Fine Battle Rifle, Part I" by M.D. Waite, Aug., 1976, p. 36. (History of the M1917 Enfield rifle.)
 "The Model 1917: A Fine Battle Rifle, Part II" by M.D. Waite, Sept., 1976, p. 34. (Description of the M1917 Enfield rifle.)
 "The Pattern 1914 Enfield Rifle" by E.G.B. Reynolds, Sept., 1965. (History and information on the P1914 Enfield.)

EXPLODED VIEWS

(Exploded view drawing and assembly instructions.)

- "1891 Mosin-Nagant Rifle" by E.J. Hoffschmidt, Nov., 1958.
 "Argentine Model 1891 Mauser Rifle" by T.E. Wessel, Aug., 1964.
 "Browning A-Bolt Rifle" by Robert Hunnicutt, May, 1995, p. 48.
 "French Model 1936 Rifle" by E.J. Hoffschmidt, March, 1967.
 "German Model 98-40 Rifle" by E.J. Hoffschmidt, Aug., 1965.
 "Japanese Arisaka Model 1905 6.5mm Carbine" by E.J. Hoffschmidt, June, 1961.
 "Lee-Enfield No. 4 Rifle" by E.J. Hoffschmidt, July, 1963.
 "Lee-Enfield Rifle No. 1, Mark III" by T.E. Wessel, Sept., 1966.
 "Madsen Model 1958 Rifle" by D. Riondan, March, 1969.

- "Mannlicher-Schoenauer Rifle" by E.J. Hoffschmidt, Sept., 1963.
 "Mauser 71/84 Rifle" by E.J. Hoffschmidt, Jan., 1966.
 "Model 1888 Commission Rifle" by D. Riondan, Nov., 1969.
 "Post-1964 Winchester Model 70" by John Kama, Apr., 1989, p. 48.
 "Remington 700 Model Rifle" by Frank G. Hart & Ludwig Olson, Jan., 1976, p. 56.
 "Remington 721-722 Rifle" by T.E. Wessel, Sept., 1959.
 "Remington Model 30" by John F. Finnegan & Ludwig Olson, July, 1976, p. 44.
 "Remington Model 40X Target Rifle" T.E. Wessel, June, 1964.
 "Remington Models 600 & 660" by F.G. Hart, Nov., 1970.
 "Ruger M77 Rifle" by Pete Dickey, Mar., 1993, p. 50.
 "Sako Center-fire Bolt-action" Mar., 1979, p. 56.
 "Springfield M1903 Rifle" by John Kama, Feb., 1989, p. 40.
 "Steyr Mannlicher Model M Rifle" by Robert W. Hunnicutt, Feb., 1984, p. 50.
 "The Italian Carcano Rifle" by E.J. Hoffschmidt, Aug., 1961.
 "The Mauser 98 Rifle" by E.J. Hoffschmidt, March, 1955.
 "The Swedish Mauser" by E.J. Hoffschmidt, June, 1962. (M98 and 96 Swedish Mauser rifles.)
 "U.S. Krag" by E.J. Hoffschmidt, Apr., 1960.
 "U.S. Model 1917 Rifle" by J.M. Triggs, Aug., 1960.
 "Winchester Model 54 Rifle," by John Kama, Aug., 1989, p. 54.
 "Winchester Straight-Pull Rifle" by Edward A. Tolosky, June, 1982, p. 42.

FRENCH RIFLES

- "22 French Training Rifle" by H.L. Joseph, Nov., 1955. (How the French converted the 1936 MAS rifle in 7.5mm caliber to fire 22 rimfire ammunition.)
 "The Implements of War (The French Army)" by J. Scofield, Oct., 1940. (Information on French military shoulder arms.)

GUNMAKING/GUNSMITHING

- "300 Magnum Bull Gun" - A Dope Bag Report, Oct., 1940.
 "1987 Custom Gunmaking Survey" by Ron Frank, Nov., 1987, p. 48.
 "A New Home For A Semi-Sporter" by Paul Caparata, Feb., 1982. (Tips on remodeling military rifles.)
 "After Walnut, What's In Stock?" by David A. Webb, Jan., 1984, p. 49.
 "B-Square Rear Sight Pusher", Dec., 1987, p. 58.
 "B-Square Scope Mount Wrenches", Oct., 1989, p. 66.
 "Barrel Crowning" - A Dope Bag Report, Jan., 1986, p. 61.
 "Barrel Removal, Fitting and Chambering" by H. MacFarland, May, 1950. (Detailed information on how to remove, fit and chamber a barrel of a centerfire bolt-action rifle.)
 "Checking Your Headspace", Jan., 1984, p. 14.
 "Counting Lands" - A Dope Bag Report, Dec., 1985, p. 54.
 "Custom Stock Shortcut" (Semi-inletted) by David A. Webb, Feb., 1987, p. 20.
 "Customized Custom Rifle" by George Martin, Feb., 1984, p. 28.
 "Decapper Repair" by Roy E. Trnband, Aug., 1987, p. 63.
 "Does Bore Fouling Reduce Accuracy?" by Gen. Vernon E. Megee, Jan., 1971, p. 99. (Tests show clean bores best for precision shooting.)
 "Extractor Clearance" by David Westbrook, Feb., 1984, p. 67.
 "Finish Those Files" by Dave Peterson, Mar., 1989, p. 69.
 "Free Springs" by Michael Lorenzo, Apr., 1987, p. 68.
 "Free-Floating Barrels" - A Dope Bag Report, Mar., 1985, p. 60.
 "Gain Twist" - A Dope Bag Report, Nov., 1985, p. 54.
 "Getting the Gun You Want" by M.G. Holmes, May, 1946. (Notes on building that custom bolt-action rifle.)
 "Good Barrels Don't Depend on Bedding" by Herb Hollister, May, 1972, p. 40. (A discussion of bedding and rifle barrels.)

"Gunsmith's Shop Helpers" by Steven Dodd Hughes, Feb., 1989, p. 26.

"Headspace Dimensions" -A Dope Bag Report, Apr., 1984, p. 66.

"Headspace Gauges", Apr., 1990, p. 46.

"Island Engineering Vise", Sept., 1985, p. 54.

"King of the Woods" by Stuart Williams, June, 1988, p. 30.

"Leather-Covered Pad" by Paul Martinez, Mar., 1987, p. 64.

"Light Hunting Rifles" by L.H. Brown, Sept., 1955. (Notes on making up a lightweight hunting rifle on the M98 action.)

"Lighter and Handier" by F. Autry, June, 1956. (Notes on building a lightweight sporting rifle.)

"Magnificent Obsession" by David A. Webb, May, 1986, p. 26.

"Make Your Own Bore Scope" by Norman E. Johnson, Mar., 1985, p. 40.

"Making A Receiver Wrench and Barrel Vise" by John L. Hinnant, Feb., 1975, p. 50.

"Measuring Pitch" -A Dope Bag Report, June, 1987, p. 66.

"More On Chip Removal" by Fred L. Shuman, Jr., Dec., 1983, p. 62.

"More On Headspace Gauges" by Richard L. Bundy, June, 1990, p. 61.

"Prolonging Match Barrel Life" by E.H. Harrison, Dec., 1970, p. 20. (Suitably handled barrel can last thousands of rounds.)

"Provisional Proof" -A Dope Bag Report, Oct., 1989, p. 67.

"Rebarreling Bolt-Action Rifles" by Charles L. Neumann, Oct., 1977, p. 38.

"Refinishing Birch Stocks" by Leroy Rohrer, June, 1986, p. 67.

"Rosin Source" (Scope mounts) by D.D. Durgin, MD, Sept., 1990, p. 61.

"Rubber Stock Clamps" by Ritchie Moorhead, Dec., 1983, p. 61.

"Scope Slippage" by James F. Petrik, May, 1990, p. 59.

"Sedgley Firing Pin", July, 1993, p. 62.

"Slugging Odd Barrels" by Arthur R. Farrer, Feb., 1990, p. 59.

"Spanner vs. Wrench", July, 1987, p. 70.

"Sporterizing a Military Mauser" by Finn Aagaard, June, 1987, p. 44.

"Stock Blank Sawing" -A Dope Bag Report, Apr., 1988, p. 68.

"Stockmaking At Home: Try It This Winter" by Phil Haskell, Nov., 1973, p. 34. (Tips for the amateur gunstocker.)

"Swap Barrels For Versatility" by C.E. Harris, Mar., 1985, p. 23.

"Testing The Mag-Na-Port" by Robert W. Hummelt, Dec., 1985, p. 22.

"That Super Sporter" by M. Holmes, Nov., 1949. (Discussion on building a fine bolt-action sporter.)

"The Complete Illustrated Guide to Precision Rifle Barrel Fitting" by John L. Hinnant, Sept., 1993, p. 71.

"The Model 1917 Barrel on the Mauser 98 Action" by F.W. Beckert, July, 1942. (Notes on rebarreling the Model 98 Mauser action.)

"The Versatile Springfield Barrel" by F. de Haas, Nov., 1963. (Describes what can be done with surplus Model 1903 Springfield barrels.)

"This Business of Bolt Handlers" by Chas. Gohseke, March, 1948. (Complete details on how to alter a bolt handle for a low-mounted scope.)

"Three Remodeled Rifles" by F.C. Ness, August, 1939. (Describes Lee-Enfields, Lebeles and Model 70 Winchester.)

"Versatile, Essential Screwdriver" by Roy Dunlap, June, 1985, p. 36.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

"Walnut Names", Dec., 1990, p. 61.

(Evaluation of a sporting rifle based on the FN Supreme Mauser action.)

HERTER'S RIFLES

"Herter Model U9 Rifle" -A Dope Bag Report, June, 1966, p. 76. (Evaluation of Herter's rifle based on the BSA action.)

"Herter U9 Super Deluxe Rifle" -A Dope Bag Report, July, 1966, p. 61.

HORNET RIFLES

"New Survival Weapon" by G.C. Sullivan, Jan., 1957. (Notes on the MA-1 22 Hornet survival rifle.)

"Pioneer Work on the Hornet" by Capt. G.A. Woody, Jan., 1933. (Information on converting the M1922 Springfield rifle to 22 Hornet.)

"The Charles Daly Hornet" by F.C. Ness, Aug., 1933. (Short report on this imported bolt-action rifle.)

HUSQVARNA

(H.V.A. Tradewinds; also see Actions)

"Husqvarna 358" -A Dope Bag Report, Oct., 1960. (Test report on the Husqvarna HVA Rifle in 358 Norma Magnum caliber.)

"Husqvarna Lightweight Rifle" -A Dope Bag Report, June, 1955, p. 66.

"Husqvarna Model 8000 Rifle" -A Dope Bag Report, May, 1969, p. 52.

"Tradewinds 600 Rifle" -A Dope Bag Report, Aug., 1968, p. 50. (Evaluation of a German-made sporting rifle.)

"Tradewinds Husky Rifles" Mar., 1993, p. 71.

ITALIAN RIFLES

"The Italian Vito Carbine" by B.D. Minihall, May, 1958.

"7,000,000 Beyonets" by G.B. Jarrett, June, 1944. (Describes the various Italian military rifles.)

JAPANESE RIFLES

"7.7mm Japanese Ammo", June, 1985, p. 61.

"Arisaka Ancestry" by M.K. Short, Nov., 1946. (Full details on the Type "I" Japanese military rifle based on the Italian Carcano action.)

"Arisaka Sporters" by J.V. Gibson & Bob Peel, June, 1949. (Notes on remodeling the Japanese Arisaka rifles.)

"Bullet-Forming" -A Dope Bag Item, May, 1959, p. 52. (Amazing story of a 6.5 Japanese rifle chambered for the 30-06 cartridge.)

"Don't Convert Jap Rifles" by W.H.B. Smith, June, 1945.

"Handy and Homemade" by H.A. Lind, March, 1954. (Information on how to remodel the Japanese military rifle, including data on making the action cock on opening.)

"Japanese Model Numbers" -A Dope Bag Q&A, Jan., 1982.

"Japanese Rifles and Carbiners" by M.D. Waite, Feb., 1958. (Excellent article describing and illustrating all Japanese breech-loading military shoulder arms.)

"Japanese Small Arms" by J.S. Diefendorf, July, 1944. (About Japanese military rifles.) Correction on p. 12 in August, 1944, issue.

"The Implements of War (Children Under the Sun)" by J. Scofield, Feb., 1941. (Describes the military arms used by Japan.)

"The Japanese Military Training Rifle" by Gary Cunningham, Jan., 1976, p. 50.

"The Quality of Jap Rifles" by L.A. Morgan, Dec., 1950. (Also lists the common markings found on Japanese military rifles and defines them.)

KRAUS-JORGENSEN RIFLES

"A DeLuxe Krag Hornet" by V.A. Coulter, Nov., 1937. (Interesting conversion of the Krag to the Hornet cartridge.)

- "A Manzanita Stock" by R.M. Broeg, July, 1934. (Notes on remodeling a Krag.)
- "Flush Magazine for the Krag" by J.M. Pearson & J.C. Leigh, Apr., 1954. (How to make a flush magazine cover for the 30-40 Krag.)
- "Krag Or Krag-Jorgensen?" -A Dope Bag Q&A, March, 1974, p. 59.
- "Krag Sporter" -A Dope Bag Q&A, March, 1974, p. 54.
- "Krag-Jorgensen Rifle" -A Dope Bag Q&A, Sept., 1972, p. 107.
- "Krag-Jorgensen Rifle" by H.L. Peterson, Dec., 1963. (Brief history of the U.S. Krag rifle.)
- "The Birth of a Hobby" by H.A. Groesbeck, March, 1945. (Notes on remodeling a Krag.)
- "The Krag Rifle" by L. Olson, Sept., 1958. (Excellent article describing and illustrating all of the different Krag rifles and carbines.)
- "The Perennial Krag" by M. Mealy, Jan., 1944. (Notes on remodeling the Krag rifle.)
- "Tyro's Rifle" by T. Henson, Oct., 1945. (More about remodeling the Krag.)
- "White Collar 30-40" by R.H. Bartlett, May, 1946. (Short notes on remodeling the Krag.)

LEE-ENFIELD RIFLES

- "7.62mm No. 4 Rifle" -A Dope Bag Report, Oct., 1962. (Describes the British conversion of the No. 4 rifle in 303 caliber to 7.62mm.)
- "303 Jungle Carbine" -A Dope Bag Q&A, April, 1974, p. 60.
- "A Target Rifle For The British Army" by E.G.B. Reynolds, April, 1971, p. 35. (Describes the 7.62mm L39A1 Lee-Enfield target rifle.)
- "Amazing Old Lady" by H.V. Stent, Aug., 1948. (Praise for the British Lee-Enfield as a hunting rifle.)
- "BNRA Picks New Enfield for Palma" by E. G. B. Reynolds, April, 1970, p. 8. (Describes the British Enfield Envoy 7.62mm target rifle.)
- "Britain's 303: From Metford to SMLE" by J.L. McCadden, Sept., 1977, p. 38. (History of the Lee-Enfield rifle.)
- "Britain's Newest Service Rifles" by Wm. Piznak, March, 1948. (Describes the No. 4 & 5 Lee-Enfield rifles.)
- "Britain's 'New Rifle'" by Mark A. Keeffe, Jan., 1995, p. 52.
- "British No. 4 Rifle Codes", Dec., 1990, p. 60.
- "Cal. 375 Lee-Enfield" -A Dope Bag Q&A, June, 1977, p. 47.
- "Deluxe Sporterizing the No. 4 Rifle" by M.D. Waite, Aug., 1959. (Complete details.)
- "Don't Overlook The Lee-Enfield" by C.E. Harris, July, 1993, p. 46.
- "Double F Marked SMLE" -A Dope Bag Q&A, Nov., 1981.
- "Enfield Firing Pin Tool" by Rafael Gutierrez, Aug., 1993, p. 77.
- "Heavier Barrel Adds to British 7.62 Rifle Accuracy" by E.G.B. Reynolds, Oct., 1961. (Details on how the British rework the No. 4 Lee-Enfield for target shooting.)
- "Lee-Enfield Makes A Comeback As A Commonwealth Target Rifle" by Maj. E.G.B. Reynolds, Jan., 1974, p. 27.
- "Lee-Enfield Stripper Clips" by Keith Alexander, Sept., 1993, p. 71.
- "More On No. 4 Enfield" (Burst barrels) by E.R. Parker, Feb., 1989, p. 64.
- "No. 4 Mk. II Enfield", Apr., 1992, p. 74.
- "No. 4 Rifle Loop", May, 1991, p. 58.
- "No. 4 Target Sights", Jan., 1995, p. 30.
- "Removing Lee-Enfield Stock" -A Dope Bag Q&A, Feb., 1973, p. 72.
- "Reworked BSA SMLE", May, 1992, p. 59.
- "Simple Sporterizing of the Lee-Enfield" by E.H. Harrison, Oct., 1955.
- "Sporterizing the Rugged Lee-Enfield" by R. Prusock, Feb., 1970, p. 28.
- "Target Accuracy With The No. 4 Rifle" by E.G.B. Reynolds, June, 1965. (How to completely accuracy the No. 4 British Lee-Enfield.)
- "The 303 Lee-Enfield" by E.H. Harrison, July, 1959. (Thorough study of the British Lee-Enfield rifle.)
- "The Lee-Enfield No. 1 Rifles" by Alan M. Petrillo, Mar., 1993, p. 74.

- "The Lee-Enfield No. 4 Rifles" by Alan M. Petrillo, Aug., 1992, p. 61.
- "The Lee-Enfield Rifle" by H.P. Martin, Aug., 1940. (Lengthy article on the Lee-Enfield used during WWI.)
- "The Lee-Enfield Story" by Ian Skennerton, Apr., 1993, p. 57.
- "The Rifle in the British Service" by A. Barker, Apr., May, June, July & Aug., 1956. (Complete history of Great Britain's military rifles with much data on the Lee-Enfield.)

MANLICHER RIFLES

- "Mannlicher Rifles" by L. Olson, Nov., 1959. (Describes all Mannlicher rifles, including the Mannlicher turnbolts.)
- "Mannlicher-Haemel Rifles" -A Dope Bag Q&A, Sept., 1974, p. 72.
- "Mannlicher-Schoenauer M72: The Most Recent Steyr Rifle" by Robert N. Sears, April, 1977, p. 41. (Technical report on the Steyr-Mannlicher rifle.)
- "Paging the 6.5" by Elmer Keith, June, 1950. (Keith on the Mannlicher-Schoenauer rifle and cartridge.)

MAUSER RIFLES (Various Commercial)

- "Dumoulin Carbine" -A Dope Bag Report, July, 1959, p. 57. (Report on the Belgian-made rifle based on the FN Mauser action.)
- "Heym Mauser" -A Dope Bag Report, Nov., 1958, p. 76. (Test report on these imports.)
- "Interarms Mark X Mauser" -A Dope Bag Report, May, 1978.
- "Interarms Mini-Mark X", May, 1991, p. 51.
- "Mauser Model 2000 Rifle" -A Dope Bag Report, April, 1969, p. 52. (Evaluating the new Mauser-built high-power sporting rifle.)
- "Mini-Mark X Accuracy" by David Flomess, Nov., 91, p. 62.
- "Saive 404 Mauser" -A Dope Bag Report, Sept., 1954, p. 50.
- "The Magnum Mauser" by P. Autry, April, 1955. (Describes the commercial magnum Mauser rifles and calibers.)

MAUSER RIFLES (Model 98)

- "A Floorplate Locking Device" by M.W. Stockel, Nov., 1958. (Instructions for making a hinged floorplate for the M98 Mauser action.)
- "BSW-Marked Mauser" -A Dope Bag Q&A, July, 1975, p. 51.
- "Disassembling Browning" -A Dope Bag Q&A, June, 1971, p. 85. (FN Mauser 98.)
- "Mauser Actions" -A Dope Bag Q&A, Feb., 1976, p. 66.
- "Mauser Introduces A New Rifle" by Ludwig Olson, March, 1971, p. 30. (Technical Report on a very interesting modern Mauser turnbolt.)
- "Mauser Model 77 Rifle" -A Dope Bag Report, June, 1982.
- "Mauser: The Rifle That Made Good, Pt. II" by Ludwig Olson, April, 1975, p. 29.
- "Remodeling the Mauser 1898 Rifle" by M.D. Waite, Sept., 1967.
- "Remodeling the Military Mauser" by M. Holmes, July & Aug., 1946. (Complete details.)
- "Save that Mauser Stock" by J.W. Ruzella, Dec., 1948. (Remodeling the M98 Mauser.)
- "Slicked-Up Mauser" by P. Barrett, Sept., 1950. (Well-illustrated article on remodeling the M98 Mauser rifle.)
- "The Finest Rifle Ever Built" by Stuart M. Williams, Sept., 1982. (Describes a custom-made 458 Magnum built on a Mauser Model 98 action.)
- "The German Mauser" by W.J. Landen, Sept., 1940. (Discussion on various M98 Mauser military rifles.)
- "The German War Mauser" by J. P. Gschwind, July, 1936. (Remodeling the M98 Mauser rifle into a sporter.)
- "Undated Mausers" -A Dope Bag Q&A, April, 1975, p. 52.
- "Veteran in Battle" by L. Olson, Aug. & Sept., 1942. (History of the M98 Mauser rifle.)
- "Wilhelm And Paul: Rx For Success in Rifle Making" by Ludwig Olson, March, 1975, p. 24. (The Mauser Story. Part I.)

- "Sportco 44 - The Palma Rifle, 1972", Oct., 1972, p. 62.
- "Sportco Appeals with Accuracy and Price" by E.G.B. Reynolds, Sept., 1970, p. 12. (Details of a 7.62mm turnbolt match rifle made in Australia.)
- "Surplus Military Rifles" - NRA Staff, Dec., 1960 & Jan., Feb. and March, 1961. (Describes the various popular surplus military rifles and their cartridges.)
- "Surplus Rifles—An Economical Choice?" by Finn Aagaard, Nov., 1993, p. 20.
- "Swedish Small Arms" by W. Piznak, Aug., 1958. (Includes information on Swedish bolt-action rifles.)
- "Swiss Military Rifles" by H. Grieder, Jan., 1956. (Illustrates and describes all breech-loading Swiss bolt-action and straight-pull military rifles.)
- "Testing a Jarrett Rifle" by Finn Aagaard, June, 1991, p. 22.
- "The Accurate Varmint Rifles" by Boyd Mace, Feb., 1992, p. 51.
- "The Blake 400" by A.H. Tedmon, Jan., 1953. (A history and study of the rare Blake bolt-action rifle.)
- "The Blake Bolt-Action Magnum Rifle" by Elmer Keith, June, 1936. (Describes this very rare American-made bolt-action rifle.)
- "The Bullpup's Revival" by Pete Dickey, Jan., 1983, p. 40.
- "The Finnish Cavalry's Special Rifle" by Charles W. Hanna, March, 1978.
- "The McMillan Talon" by Finn Aagaard, Feb., 1992, p. 24.
- "The Moisin Rifle: Ugly But Effective" by C.E. Harris, Mar., 1991, p. 40.
- "The Palmer Carbine" by M.B. Peladeau, Aug., 1964. (History and details of the first U.S. breech-loading bolt-action military carbine arm.)
- "Thoughts on Custom Rifles" by Finn Aagaard, Mar., 1991, p. 36.
- "Three Venerable Bolt-Action Arms" by E.D. Crabbe, Feb., 1941. (Describing the Greene, Prussian Needle and Terry bolt-action arms.)
- "Tikka M658 Rifle", Nov., 1989, p. 60.
- "Turkish Rifles" - A Dope Bag Q&A, March, 1975, p. 48.
- "U.S. Custom Rifles: Now Second To None" by Tom Brakefield, Jan., 1975, p. 22.
- "What Is 4140?" by David R. Thompson, Sept., 1977, p. 54. (Information on the steel most commonly used in firearms manufacture.)
- "Who Says The Bolt-Action Is Slow?" by Finn Aagaard, Sept., 1982.
- "Why Magazine Big-Bore Rifles Are Best, Part I" by Jacques P. Lott, Jan., 1972. (Discusses the merits of the turnbolt magazine rifle system.) Part II in Feb., 1972.
- "Wichita 308 Varminter" - A Dope Bag Report, June, 1978.
- "3-Line" Rifle" - A Dope Bag Q&A, Nov., 1981.

MOSBERG RIFLES

- "Mosberg M800 CVT Rifle" - A Dope Bag Item, Oct., 1972, p. 88.
- "Mosberg Model 810 Rifle" - A Dope Bag Report, May, 1971, p. 50.
- "Mosberg RM-7" - A Dope Bag Report, Aug., 1980.
- "Mosberg: More Gun for the Money" by Victor Havila, July, 1995, p. 31.

NEWTON RIFLES

- "Charles Newton, Father Of The 25-06" by M.D. Waite, May, 1971, p. 33. (Traces the history of the Newton Arms Co. and describes his cartridges and rifles.)
- "Early Newton Rifle" - A Dope Bag Q&A, Jan., 1972.
- "Newton Looking Lugs" - A Dope Bag Q&A, Feb., 1977, p. 50.
- "The Newton—An American Original" by Robert N. Sears, March, 1980.

PERSONALIZED

- "Griffin & Howe: Custom Gunmakers" by Paul Caparotta, April, 1978.

- "Griffin & Howe—Yesterday & Today" by W.F. Parkerson, June, 1980.
- "Shelhamer—Classiest of The Stock" by Peyton Autry, Jan., 1977, p. 40. (In this article you meet Thomas Shelhamer and see some of the rifles he has stocked.)
- "Shilen Rifles" by Col. Charles Askins, Sept., 1983, p. 38. (All about Ed Shilen and the rifles he makes.)
- "The Rifle and Townsend Whelen" by Ken Warner, Oct., 1978. (A tribute to the late Col. Townsend Whelen.)
- "Weatherby Has Made his Mark" by Col. Charles Askins, Oct., 1982.

REMINGTON RIFLES

- "6.5mm Remington Magnum" - A Dope Bag Report, Aug., 1966, p. 46. (Evaluation of the M600 Remington carbine in 6.5mm Magnum caliber.)
- "17 Remington Meets Expectations" by Ludwig Olson, July, 1971, p. 34. (Technical report on Remington's 17-caliber cartridges and Model 700 rifle.)
- "22-250 Remington" - A Dope Bag Report, June, 1965. (Thorough evaluation of the M700 BDL Remington and the 22-250 cartridge.)
- "25-06 Remington" - A Dope Bag Report, July, 1970, p. 58. (Detailed test report on the 25-06 M700 BDL rifle.)
- "722-721 Southpaw Conversion" - A Dope Bag Report, Dec., 1955, p. 62. (A Dale M. Guise left-hand conversion described.)
- "Converting Model 722 to 22-250" by W. Dresser, Feb., 1958.
- "Exploded Views: Remington-Lee Rifles" by E.A. Tolosky, April, 1980.
- "Improving The Model 721 Remington" by Bob Milek, Nov., 1971, p. 56. (Gunsmithing ideas for this popular rifle.)
- "Latest Remington 700's" - A Dope Bag Report, Sept., 1969, p. 78.
- "Loading Lee Navy" by F.R. Hedblith, Jan., 1989, p. 70.
- "Minute-of-angle 722" by R.V. Thompson, July, 1954. (Accurizing the M722 Remington rifle.)
- "New Remington Carabines" - A Dope Bag Report, May, 1968, p. 57. (Details on the M660 Remington carabines.)
- "New Remington M700 Rifle" - A Dope Bag Report, July, 1974.
- "New Remington Rifle" - A Dope Bag Report, Sept., 1962. (Comprehensive evaluation of the M700 Remington rifle.)
- "New Remington Rifles" - A Dope Bag Report, Apr., 1967, p. 46. (Evaluation of the Remington M788 rifle.)
- "Remington 700 7mm Express" - A Dope Bag Report, Nov., 1979.
- "Remington 700 Classic 257" - A Dope Bag Item, Jan., 1983, p. 60.
- "Remington 788 223" - A Dope Bag Q&A, Nov., 1977.
- "Remington Custom" Aug., 1995, p. 6.
- "Remington Eyes 375 H&H Classic" - A Dope Bag Item, Jan., 1982.
- "Remington Left-Hand M788 Rifle" - A Dope Bag Report, Sept., 1969, p. 84.
- "Remington M600 Carbine" - A Dope Bag Report, Apr., 1965, p. 44. (Evaluation of the Remington M600 Magnum Carbine.)
- "Remington M700 BDL DM", July, 1995, p. 49.
- "Remington M700 Classic and VS", Oct., 1992, p. 61.
- "Remington M700 VS SF Rifle", Oct., 1994, p. 59.
- "Remington M1934 Rifle" - A Dope Bag Q&A, Feb., 1972. (Describes a special 7mm rifle built on the M30 Remington action.)
- "Remington Model 30 Rifle" - A Dope Bag Report, May, 1990, p. 56.
- "Remington Model 30" by Ludwig Olson and John F. Finnegan, July, 1976, p. 44. (Exploded-view drawing.)
- "Remington Model 600" - A Dope Bag Report, Apr., 1964, p. 44.
- "Remington Model 700 AS", Feb., 1991, p. 51.
- "Remington Model 700 Rifle" by Ludwig Olson and Frank G. Hart, Jan., 1976, p. 56. (Exploded-view drawing.)
- "Remington Model 720" - A Dope Bag Q&A, Aug., 1980.
- "Remington Model 725" - A Dope Bag Report, Apr., 1958, p. 56.
- "Remington Model 788 Rifle" by Frank G. Hart & M.D. Waite, May, 1971, p. 48. (Exploded-view drawings.)

- "Remington Model Seven FS Rifle", Sept., 1988, p. 71.
 "Remington Model Seven Rifle" -A Dope Bag Report, June, 1983, p. 51.
 "Remington Model Seven Rifle", June, 1983, p. 51.
 "Remington Model Seven Take-Along Carbine" by Finn Aagaard, Oct., 1988, p. 46.
 "Remington Offers Bench Rest Rifle" -A Dope Bag Report, Jan., 1970, p.30.
 "Remington Recall", Dec., 1978, p. 63. (A recall notice concerning Remington Models 600, 660 and 600 Mohawk carbines.)
 "Remington Rifles" -A Dope Bag Report, Dec., 1961, p. 76. (Test and evaluation of the M40-X Remington centerfire target rifle.)
 "Remington Varmint Special" -A Dope Bag Report, May, 1967, p. 56. (Evaluation of the M700 Remington Varmint Special rifle.)
 "Remington's Model 700 Classic" -A Dope Bag Report, Aug., 1978.
 "Remodeling the 722" by G.A. Leyner, Dec., 1952. (Notes on building a lightweight Mannlicher-type sporter from a M722 Remington.)
 "Remodeling the Remington 721" by W. Campbell, Feb., 1949.
 "Scarcity Boosts Value Of Remington-Keene Arms" by M.D. Waite, April, 1972, p. 19. (History and description of an early Remington bolt-action rifle.)
 "Shooters Appreciate An Inexpensive, Accurate Rifle" by C.E. Harris, June, 1977, p. 28. (Tips on upgrading the Remington Model 788.)
 "Something New" by J.S. Hatcher and A. Barr, March, 1948. (Detailed report of the Model 721 Remington rifle.)
 "The Ultimate in Rifle Accuracy" by Glen Newick, Feb., 1991, p. 57.
 "What's new for '50'" -A Dope Bag Report, Feb., 1950. (Evaluation reports on the 222-caliber M722 Remington and the 22 Hornet Sako.)

RUGER RIFLES

- "Bolt Action Model 77: In the Ruger Tradition" -NRA Staff, Feb., 1969. (Detailed report on Ruger's sporting rifle.)
 "Model 77 Mark II Mag. Heavyweight From Ruger" by F.R. Hebditch, Aug., 1990, p. 46.
 "Ruger M77 Express Rifle", Jan., 1995, p. 60.
 "Ruger M77 Magnum Rifle" -A Dope Bag Report, April, 1971, p. 35.
 "Ruger M77 Mark II Heavy Barrel Varmint Rifle", Aug., 1992, p. 57.
 "Ruger M77 Target Rifle", Jan., 1994, p.54.
 "Ruger M77/22 Hornet Rifle", June, 1995, p. 53
 "Ruger Model 77 International" -A Dope Bag Report, Dec., 1982, p. 57.
 "Ruger Model 77 Mark II Rifle", Dec., 1989, p. 48.
 "Ruger Model 77 Varmint Rifle" -A Dope Bag Report, Sept., 1970, p. 84.
 "Ruger Palma Match Rifle", July, 1992, p. 20.

RUSSIAN RIFLES

- "A Home-Made Russian Sporter" by E.J. Witzel, Feb., 1934. (Short piece on remodeling the Mosin-Nagant rifle.)
 "Under the Red Star-The Russian Rifle" by G. Underhill, Aug., 1941. (Describes the Russian military rifles and training.)

SAKO RIFLES

- "Exploded Views: Sako Bolt Actions" by Technical Staff, March, 1979.
 "Forester Rifles" -A Dope Bag Report, Oct., 1960, p. 66. (Report and evaluation of the Sako L579 rifle.)
 "Sako 6mm PPC Repeater", Apr., 1989, p. 55.
 "Sako Classic & Safari Grade Rifles" -A Dope Bag Report, Sept., 1980.
 "Sako Finbear" -A Dope Bag Report, Dec., 1961, p. 81. (Test report on the Sako L61 rifle.)
 "Sako Forester" -A Dope Bag Report, Sept., 1958, p. 70. (Test report on the Sako L57 rifle.)
 "Sako Heavy-Barrel Rifle" -A Dope Bag Report, Aug., 1954, p. 62.

- "Sako M78/22 Hornet" -A Dope Bag Item, March, 1980.
 "Sako Model 72 Rifle" -A Dope Bag Item, Nov., 1972, p. 71.
 "Sako P72 Rifle" -A Dope Bag Report, June, 1979.
 "Sako PPC Varmint", Jan., 1988, p. 54.
 "Sako TRG-S Rifle", May, 1993, p. 50.
 "The Echo of the Sako" by A. Wilson, Oct., 1953. (Notes on the 222 Sako rifle.)

SAVAGE RIFLES

- "A Real Modern-Game Rifle" by A.M. Crane, July, 1937 (Describing the Savage M23 sporter in 25-20 caliber.)
 "New Savage Hi-Power Rifles" -A Dope Bag Report, July, 1950, p. 38; May, 1953, p. 64. (Describing the M340 and M342 Savage rifles in 30-30 and 22 Hornet calibers.)
 "Savage M110C 25-06 Rifle" -A Dope Bag Report, Aug., 1970, p. 66.
 "Savage M111 Chieftain Rifle" -A Dope Bag Q&A, Oct., 1975, p. 69.
 "Savage Model 110 MC" -A Dope Bag Report, Aug., 1965, p. 69.
 "Savage Model 110 MC" -A Dope Bag Report, Oct., 1958
 "Savage Model 110 Rifle" by M.D. Waite, Feb., 1958. (Detailed Dope Bag Report.)
 "Savage Model 110 Rifle" by T.E. Wessel, Sept., 1961. (Exploded-view drawing and assembly instructions.)
 "Savage Model 110C Rifle" -A Dope Bag Report, June, 1966 p. 68. (Evaluation of the M110 with a detachable box magazine.)
 "Savage Model 110S Silhouette Rifle" -A Dope Bag Report, Oct., 1978.
 "Savage Model 116FSK Rifle", Apr., 1995, p. 57.
 "Savage Model 116FSS Rifle", May, 1993, p. 50.
 "Savage Model 340 Rifle" -A Dope Bag Report, Oct., 1969, p. 95. (Short report on the 1969 version of this low-cost rifle.)
 "Savage Model 340V Rifle" -A Dope Bag Report, May, 1965, p. 74.
 "Savage Model MCL" -A Dope Bag Report, Jan., 1959, p. 56. (Report on the left-hand M110.)
 "Savage Super-Sporter" -A Dope Bag Q&A, Feb., 1975, p. 62.
 "Savage-Anschutz M153 Rifle" -A Dope Bag Report, July, 1964, p. 62. (Evaluation of the 222 Anschutz rifle.)
 "The Savage Varmint Rifle" by M.D. Waite, Sept., 1975, p. 28. (A Dope Bag Report on the Savage Model 112 Varmint rifle.)
 "Why Not This One?" by F. Merillat, Sept., 1933. (Information on handloading for the M23 Savage in 25-20 caliber.)

SCHULTZ & LARSEN RIFLES

- "Schultz & Larsen 65" -A Dope Bag Report, July, 1960, p. 48. (Full details on this interesting Danish rifle.)
 "Schultz & Larsen 68DL Rifle" -A Dope Bag Report, Aug., 1967, p. 68.
 "Schultz & Larsen M-60" -A Dope Bag Report, Dec., 1957.
 "Schultz & Larsen Rifle" -A Dope Bag Report, Sept., 1955, p. 70.

SNIPER RIFLES

- "German Sniping Equipment" by R.F. Dunlap, Jan., 1945. (Describes the M98 Mauser sniper rifle.)
 "Sniping Rifles" by C.H. Howell, Jr., Apr. & May, 1947.
 "The Jap Military Scope" by C.H. Williams, July, 1944.
 "The No. 4 Rifle Mark I (T)" by E.G.B. Reynolds, Nov., 1964.
 "U.S. Sniping Rifles" by M.D. Waite, June, 1965. (Among others, describes the Krag, Springfield and Enfield sniping rifles.)

SPRINGFIELD RIFLES

- "22 Springfield Rifles" by M.D. Waite, July, 1954.
 "'03 Conversion Kit" -A Dope Bag Report, March, 1959, p. 57. (Describes the Numrich kit to convert M1903s to 22 rimfire caliber.)
 "'03 Firing Pin" -A Dope Bag Report, Jan., 1959, p. 54. (Describes the B-Square one-piece firing pin for the M1903.)

- "03 Magazine Cut-Off" -A Dope Bag Q&A, Feb., 1976, p. 66.
- "A 30-06 Pistol" by O.T. Littleton, Apr., 1945. (On making a handgun from the M1903.)
- "A Fallen Springfield" by O.R. Parizek, Nov., 1950. (On making a M1903 into a 410 shotgun.)
- "A Free-Rifle from a 1903 Springfield" by C.J. Davis, May, 1963.
- "A the Match Rifle from the 03A3" by M.D. Waite, Sept., 1957.
- "Cocking Piece Sight" -A Dope Bag Q&A, March, 1971, p. 60.
- "DCM Shoppers' Guide" by E. Brown, Apr., 1946. (Notes on Springfield and Enfield rifles then available to NRA members.)
- "DCM Treasure" by T.B. Gresham, July, Aug., Sept., Oct. & Nov., 1948. (Detailed instructions on remodeling M1903 rifles, including stocking.)
- "Death Valley Shots" by D. Lanagan, Apr., 1945. (Story about a 25 Niedner Springfield.)
- "Economy Sporter from the '03A3" -NRA Staff, May, 1964.
- "First M1903 Springfield" -A Dope Bag Q&A, May, 1975, p. 63.
- "Guinea Pig Varminster" by M. Holmes, Mar., 1947. (Accuracy experiments on a 1903 Springfield varmint rifle.)
- "Is The M1903 Action Obsolete?" -A Dope Bag Q&A, Sept., 1971, p. 98.
- "Lightweight Mountain Sheep Rifle" by J. Bryant, Sept., 1970, p. 32. (Making up a lightweight Turnbull sporting rifle.)
- "M1898 vs. M1903 Stocks" -Jan., 1987, p. 66.
- "M1903 Parts Nomenclature" -A Dope Bag Q&A, Sept., 1974, p. 79.
- "M1903 Rifle Proof Marks" -A Dope Bag Q&A, Jan., 1974, p. 64.
- "M1903 Springfield Parts" -A Dope Bag Q&A, Nov., 1976, p. 56.
- "M1903 Springfield" -A Dope Bag Q&A, April, 1971, p. 61.
- "Model 1903 Springfield Freeze-up" by Finn Aagaard, Dec., 1986, p. 61.
- "New Springfield" -NRA Report, Sept., 1943. (Introducing the M1903A3 and M1903A4 rifles.)
- "O'Connor's Other Rifle" by Bob Hills, April, 1980. (Describes a Model 1903 Springfield Custom Sporter.)
- "Reheat Treating Springfields" -A Dope Bag Report, Mar., 1984, p. 64.
- "Remodeling the 03A3 Springfield" by M.D. Waite, Aug., 1957. (Complete information, plus instructions on how to drill and tap the receiver for sights and scope mounts.)
- "Remodeling Your Springfield" by C.E. Graves, Oct., 1950. (On remodeling the M1903.)
- "Sedgley Safety Firing Pin" -A Dope Bag Q&A, Feb., 1976, p. 68.
- "Sporterizing the Springfield Pistol-Grip Stock" by F. de Haas, Dec., 1962. (How to remodel the Type C stock.)
- "Springfield 30-06 Barrel" -A Dope Bag Q&A, Dec., 1975, p. 62.
- "Springfield Cocking Piece" -A Dope Bag Q&A, June, 1976, p. 50.
- "Springfield Front Sight" -A Dope Bag Q&A, Nov., 1976, p. 49.
- "Springfield M1903 Sight Adjustment" -A Dope Bag Report, July, 1989, p. 68.
- "Springfield M1903 Sight" -A Dope Bag Q&A, Oct., 1981.
- "Springfield Patent Troubles" by G. Lyle, Dec., 1949.
- "Springfield Rifles—A Chapter From Hatcher's Notebook" by J.S. Hatcher, Oct., 1947. (History of the M1903.)
- "Springfield Triggers" -A Dope Bag Q&A, Aug., 1972, p. 80.
- "The '03 Era" by Clark S. Campbell, Jan., 1995, p. 33.
- "The '03 Springfield, America's Classic Bolt Rifle" by C.E. Harris, June, 1995, p. 44.
- "The Last Springfield M1903" -A Dope Bag Q&A, Feb., 1971, p. 58.
- "The Rock Island '03" by C.S. Ferris, Feb., 1993, p. 49.
- "The Sedgley Short-Action Springfield" by F.T. Chamberlin, Dec., 1934. (Describes a rifle with action shortened for the 250 Savage cartridge.)
- "Trigger For Your Springfield" by F.F. Berman, July, 1950. (How to make a single-stage adjustable trigger for the M1903.)
- "U.S. Model M1 Bolt-action Carbine" -A Dope Bag Report, Aug., 1986, p. 60.

- "United States Rifles, Caliber 30" by T. Whelen, Aug., 1934. (Covers various M1903s and the M1917.)
- "USMC M1903 Sights" -A Dope Bag Q&A, Dec., 1974, p. 67.
- "Vacation Echoes" by N.H. Roberts, Jan., 1935. (Describes test-firing a Griffin & Howe custom 257 Springfield.)
- "Weak M1903 Receivers" -A Dope Bag Report, June, 1984, p. 63.
- "Which Mauser?" (Springfield 1903) by James E. Keenan, Aug., 1995, p. 12.

STEYR-MANNLICHER RIFLES

- "Austrians Adopt A New Sniper Rifle" by E.H. Harrison, June, 1971, p. 23. (Technical information on the Steyr-Mannlicher target/sniper rifle.)
- "Mannlicher-Schoenauer M72: The Most Recent Steyr Rifle" by Robert N. Sears, April, 1977, p. 41. (Technical report on the Steyr-Mannlicher rifle.)
- "Steyr Model M Professional Rifle" -A Dope Bag Report, Sept., 1982.
- "Steyr SSG Match" -A Dope Bag Report, Dec., 1981.
- "Steyr-Mannlicher SL Rifle" -A Dope Bag Report, March, 1968, p. 47. (Evaluation of the newest Mannlicher rifle.)
- "Steyr-Mannlicher Model L Varmint" -A Dope Bag Report, Mar., 1990, p. 45.
- "Steyr-Mannlicher Model M Luxus Rifle" -A Dope Bag Report, July, 1988, p. 64.

STOCKS & STOCKMAKING

- "Bedding the Mauser-Type Rifle" -NRA Staff, Mar., 1963.
- "Fundamentals of Gunstock Design" by C. Barker, Feb., 1944. (Sound information on stock design for bolt-action rifles.)
- "Gunstock Design" by A. Grymson, Oct., 1963. (Details of the famous "Grymson" sporter stock.)
- "Gunstocks & Accuracy" by C. Taylor & D.A. Robbins, Oct., 1949.
- "Handicapped Barrels" by H.J. Burkhard, Dec., 1940. (Stocking and bedding a bolt action.)
- "Inletting for Accuracy" by M. Holmes, Feb., 1947. (Finer points of inletting bolt-action rifles.)
- "Laminated Stock Blanks" by J.F. Himes, Jan., 1950.
- "Making a Gunstock" by O.V. Stephens, Jr., Nov., 1947. (Design, layout, inletting and finishing.)
- "Rebedding the Bolt Actions" by B. Popowski, Sept., 1941. (Tips on bedding the M70 Winchester.)
- "Remodel That Stock To Suit Your Taste" by J. Hanson, July, 1970, p. 42. (Tips on remodeling the factory stock on a Turnbull sporting rifle.)
- "Remodeling that Factory Stock" by C.A. Shields, Dec., 1955.
- "Rifle Restocking" by J. Feenick, June, 1943. (How to restock a bolt-action rifle starting from a blank.)
- "Stocking Sporter & Varmint Rifles" by M.G. Holmes, Oct., 1962.
- "Stocking the Match Rifle" by R.F. Dunlap, Aug., 1962.

TRIGGERS

- "An Adjustable Military Trigger" by A.J. Tiroff, Dec., 1956. (How to modify the common military bolt-action trigger so it is adjustable.)
- "A Set Trigger for the Model 70" by S. Kol, July, 1962. (How to install a common double set trigger.)
- "Bench-Rest Shooting: Innovation By Design" by Michael Bussard, July, 1977, p. 30. (Describes an unusual bench-rest rifle.)
- "Buying A Used Competition Rifle" by C.E. Harris, Feb., 1973, p. 17.
- "Danish M52 Rifle" -A Dope Bag Report, June, 1957, p. 67. (Covers the M52 30-06 target rifle.)
- "Designing An NRA Match Rifle" by Charles M. Byers, Nov., 1972, p. 33.
- "Let's Examine the Free Rifle" by R.F. Dunlap, Nov., 1952. (Information on building free rifles on bolt actions.)
- "Making a Free-Rifle" by W.B. Vincent, Jan., 1967.

- "Modern Bench Rest Shooting" by C.H. Hollidge, June, 1962.
- "New Rule Broadens British High-Power Rifle Shooting" by E.H. Harrison, Jan., 1969. (Describes some bolt-action target rifles used in England.)
- "Rifles for V's at 1000 Yards" by L.F. Moore, July, 1968.
- "Self-Setting Triggers" by F.C. Ness, July, 1939. (Describes the Pike self-setting trigger mechanism for centerfire bolt-action rifles.)
- "Set Triggers" by F. de Haas, July, 1963. (Describes several set trigger mechanisms for bolt-action rifles, discusses their purpose and use.)
- "Sporting Triggers for Military Rifles" by M.D. Waite, March, 1965. (Review of the commercial triggers available.)
- "The Metal Silhouette Rifle" by Roy Dunlap, May, 1977 p. 22. (Discusses rifles that can be used for silhouette shooting.)
- "The 'Rigid Look' As Built Into Bench-Test Actions" by Stuart Otten and John Eaton, Dec., 1976, p. 27.
- "Thoughts on Free Rifles" by A.E. Cook, Apr., 1956.
- "Winchester Model 70... Set Triggers" by J.E. Gebby, May, 1959.

WEATHERBY RIFLES

- "240 Weatherby Magnum" -A Dope Bag Report, Feb., 1968, p. 50. (Evaluation of the Mark V 240 Weatherby.)
- "More on 270 Weatherby" by Myron C. Muth, Sept., 1991, p. 75.
- "The Weatherby Alaskan" by Robert Hunnicutt, Dec., 1992, p. 30.
- "The Weatherby Mark V Stainless" by Robert Hunnicutt, May, 1995, p. 40.
- "Weatherby 22-250 Rifle" -A Dope Bag Report, Apr., 1968, p. 51.
- "Weatherby Fiberglass", Mar., 1987, p. 53.
- "Weatherby Fibermark Rifle", Feb., 1984, p. 58.
- "Weatherby Mark V Rifle" by T.E. Wessel, Apr., 1963. (Exploded-view drawing and assembly instructions.)
- "Weatherby Mark V" -A Dope Bag Report, Nov., 1958, p. 66.
- "Weatherby Vanguard Rifle" -A Dope Bag Report, Nov., 1970, p. 68. (Test report on this medium-priced Japanese-made sporting rifle.)
- "Weatherby Vanguard VGX Deluxe Rifle", Feb., 1990, p. 53.
- "Weatherby Varmintmaster" -A Dope Bag Report, July, 1964, p. 72. (Evaluation of the Mark V 224 Weatherby.)
- "Weatherby's Big Bore" by Finn Aagaard, Sept., 1994, p. 42.
- "Weatherby, the Mark V Story" by Robert Hunnicutt, Dec., 1992, p. 28.
- "Weatherby: The Man, The Gun, The Legend" by Gris Gresham, June, 1992, p. 85.

WINCHESTER RIFLES

- "225 Winchester" -A Dope Bag Report, Oct., 1964. (Evaluation on the M70 varmint rifle.)
- "A 54 Winchester Conversion" by H.R. Longo, June, 1937. (Converting a 30-30 to a 30-40.)
- "A 243 Win. Match rifle" by Robert Lawyer Gilkey, Jan., 1977, p. 32.
- "A Serious Rifle" by C.E. Harris, Sept., 1975, p. 34. (Building a custom Model 70 Winchester.)
- "Exploded Views: Winchester Hotchkiss Model 1879" by Edward A. Tolosky, Jan., 1981.
- "Exploded Views: Winchester Hotchkiss Model 1883" by Edward A. Tolosky, June, 1981.
- "For the Biggest Game" by J.S. Hatcher, Aug., 1956. (Report on the M70 in 458 Magnum.)

- "M70 Trigger Corrections" by A.H. Barr, July, 1943. (How to improve the M70 trigger.)
- "Mannlicher-Style M70 Rifle" -A Dope Bag Report, Jan., 1968, p. 55.
- "Model 54 Winchester Types" -A Dope Bag Q&A, Oct., 1971, p. 88.
- "Model 70 Featherweight" -A Dope Bag Report, Aug., 1982.
- "Model 70 Winchester" -A Dope Bag Report, March, 1964, p. 44. (Evaluation of the 1964 version of the M70.)
- "New and Old Model 70" -A Dope Bag Q&A, Feb., 1980.
- "New Winchester Model 70" -A Dope Bag Report, May, 1968, p. 48. (Evaluation of the 1968 rifle.)
- "Return of the Rifleman's Rifle" (Win. M70) by Robert Hunnicutt, Mar., 1994, p. 36.
- "Rifle for the Southwest" by E.B. Mann, Jan., 1950. (Making a lightweight sporter of the M70.)
- "The Ideal 25 Sporter" by F.C. Ness, June, 1938. (Describing the M70 in 250 caliber.)
- "The Model 54 Winchester Hornet Rifle" by F.C. Ness, May, 1933.
- "The New Model 70 Winchester" by F.C. Ness, Nov., 1936. (First Dope Bag report.)
- "The Winchester Model 70 Story, Part I" by Pete Dickey, Oct., 1980. (Part II in Nov., 1980; Part III in Dec., 1980.)
- "Three-in-one Rifle" by R. Hutton, Apr., 1950. (Discusses interchangeable stocks on the M70.)
- "Two Guns of Verde Valley" by J. Berryman, Apr., 1946. (Story on the Savage 23D Hornet and the M70.)
- "Winchester M70 Sharpshooter", Feb., 1994, p. 61.
- "Winchester Model 70 Rifle" -A Dope Bag Q&A, Dec., 1973, p. 63.
- "Winchester Model 70 Target Rifle" -A Dope Bag Report, Oct., 1970, p. 80.
- "Winchester Model 54 Striker" -A Dope Bag Q&A, Sept., 1973, p. 88.
- "Winchester Model 70 DBM Rifle", June, 1993, p. 46.
- "Winchester Model 70 Heavy Barrel Varmint", Apr., 1990, p. 43.
- "Winchester Model 70 No. 1" by Mike Bodwell, June, 1990, p. 38.
- "Winchester Model 70 Rifle" by J.M. Triggs, May, 1962. (Exploded-view drawing and assembly instructions.)
- "Winchester Model 70 Screw Torque" -A Dope Bag Report, Feb., 1990, p. 58.
- "Winchester Model 70 Sporter", Jan., 1989, p. 58.
- "Winchester Model 70: The First Fifty Years" by Wayne Van Zwoll, Dec., 1987, p. 30.
- "Winchester Model 670 Rifle" -A Dope Bag Report, July, 1966, p. 54. (Evaluation and test report.)
- "Winchester Model 770 Magnum" -A Dope Bag Report, July, 1970, p. 70.
- "Winchester's New Super Model 70" by Robert W. Hunnicutt, Feb., 1990, p. 24.

UNCLASSIFIED

- "Bolt Action Operation" by J.F. Kohl, Sept., 1966.
- "German Arms Codes" by W.H.B. Smith, Apr., 1947.
- "Handling Bolt-Action Centerfire Rifles" by NRA Staff, Oct., 1961. (How to operate, load, fire, & field strip the most common bolt-action rifles.)
- "Some Interesting Clips" by C.H. Yust, Jr., June, 1960. (Covers many different military rifle cartridge clips.)

- "Bolt Action 284" by Bob Hagel, 19th ed., 1965.
- "Bolt Action Brush Guns for Deer" by Frank B. Petrini, 35th ed., 1981.
- "Browning's T-Bolt I Like" by G.N. Ted Dentay, 41st ed., 1987.
- "Budget Scout Rifle" by Jim Thompson, 43rd ed., 1989.
- "Charles Newton's Leverbolt" by Bruce M. Jennings, Jr., 50th ed., 1996.
- "Guns For the Twenty Percent" by James T. Fender, 36th ed., 1982. (Left-hand turnbolt actions.)
- "How Good Are Factory Rifles" by Sam Fadala, 47th ed., 1993.
- "Metric Rifles and Cartridges" by Frank C. Barnes, 19th ed., 1965.
- "New Mannlicher Rifles" by Warren Page, 25th ed., 1971. (All about Steyr-Mannlicher rifles.)
- "Newton's First Rifle" by Wilf E. Pyle, 42nd ed., 1988.
- "Straight-pull Rifles" by Finn Nielsen, 45th ed., 1991.
- "The 1923 BSA Rifle" by Larry S. Sterett, 28th ed., 1974. (New information on BSA rifles and early belted cartridges.)
- "The Assault On Palmirino" by David D. Brennan, 42nd ed., 1988.
- "The Big Little Mannlicher Schoenauer" by Don L. Henry, 50th ed., 1996.
- "The Mountain Rifle Question" by Ken Warner, 39th ed., 1985.
- "The New Takedown" by Ken Warner, 39th ed., 1985.
- "The Proper Big Game Rifle" by Elmer Keith, 2nd ed., 1946.
- "The Sheep Rifle" by Jack O'Connor, 12th ed., 1958.
- "The Story of a Rifle" by Ken Waters, 39th ed., 1985.
- "Ultimate Coincidence" by Wilfrid Ward, 44th ed., 1990.
- "Ultra Light's Model 20" by Layne Simpson, 40th ed., 1986.
- "Varmint Rifles" by Clyde Ormond, 13th ed., 1959.

PERSONALITIES

- "Bob Emmos—Stockmaker" by Ken Waters, 33rd ed., 1979.
- "Chapman & Haskins Rifles" by Les Bowman, 23rd ed., 1969.
- "Crack Rifle Maker" by Jack O'Connor, 10th ed., 1956. (Al Biesen and his rifles.)
- "Ed Shilen—Riflesmith" by John T. Amber, 20th ed., 1966.
- "Griffin & Howe" by Lucian Cary, 28th ed., 1974. (A history and a tribute.)
- "Haiger and His Rifles" by Phil Sharpe, 7th ed., 1953.
- "Jack Lewis On Guns, Prices, and Hype" by Ken Warner, 48th ed., 1994.
- "John M. Browning: The Man and His Patents" by D.A. Tomlinson, 39th ed., 1985.
- "Keith Stegall—Stockmaker", 11th ed., 1957.
- "Leonard M. Brownell (1922-1982)", 37th ed., 1983.
- "Leonard Mews, Artist in Wood", 8th ed., 1954.
- "Remembering John" (John Amber) by Ken Warner, 41st ed., 1987.
- "Stockmaker Supreme" by Dale Goens, 24th ed., 1970. (Dale Goens and his rifles.)
- "Stocks by Len Brownell", 12th ed., 1958.
- "The Rifles of James Paris" by Larry S. Sterett, 26th ed., 1972. (Includes a history of Lee's turnbolts. Part II in 27th, 1973 ed.)
- "Wilhelm Brenneke" by H. Jung and L. P. Davison, 14th ed., 1960.

REMINGTON RIFLES

- "7mm-08 Remington: Gun and Cartridge" by Layne Simpson, 35th ed., 1981. (The 7mm-08 in the Remington M-788 rifle.)
- "Remington 40-XB Rifle" by Jim Horton, 22nd ed., 1968.

- "Remington's 721-722: The Story of a Success" by Stuart Otteson, 36th ed., 1982.
- "Remington's Big Seven" by Bob Hagel, 18th ed., 1964.
- "Testfire: Remington Model Seven", 38th ed., 1984.
- "Too Good Too Soon" by John Haviland, 45th ed., 1991.

RIFLES—U.S. AND FOREIGN

- "American Rifles Today" by Maj. Gen. J. S. Hatcher, 9th ed., 1955.
- "American Rifles, 1955-56" by J. S. Hatcher, 10th ed., 1956.
- "Foreign Arms in America", 5th ed., 1951 through 38th ed., 1984.
- "Foreign Sporting Arms" by Charles T. Haven, 3rd ed., 1947; 5th ed., 1951.
- "Gun Digest Rifle Guide" by Bob Wallack, 15th ed., 1961.
- "Rifle Review" section by Layne Simpson, 39th-50 eds., 1985-1996. (Brief descriptions of new rifles of all types.)
- "Rifle Roundup" by Dick Simmons, 4th ed., 1949.
- "Rifle Round-Up 1956-57" by Maj. Gen. J. S. Hatcher, 11th ed., 1957.
- "Rifles and Shotgun of American Make" by Maj. Gen. J. S. Hatcher, 5th ed., 1951; 6th ed., 1952.
- "Rifles of American Make" by Maj. Gen. J. S. Hatcher, 7th ed., 1953; 8th ed., 1954.
- "U.S. Rifle Review 1957-58" by Bob Wallack, 12th ed., 1958.
- "U.S. Rifles and Shotguns" by Larry Koller, 15th ed., 1961; by John T. Amber, 16th-18th eds., 1962-1964; by Pete Kuhlhoff, 19th-20th eds., 1965-1966.

RUGER RIFLES

- "New Ruger Rifles" by John T. Amber, 23rd ed., 1969. (Includes Model 77 bolt-action.)
- "Ruger's High-tech 7.62x39" by Nick Croyle, 47th ed., 1993.
- "The Model 77 Ruger Rifle" by Daniel Peterson, 33rd ed., 1979.
- "The Ruger 220 Swift—An Instant Success" by Jim Horton, 29th ed., 1975. (Ruger Model 77.)
- "The Ultimate 250-3000" by Vernon E. Meggie, 30th ed., 1976. (About the Ruger Model 77.)

SPRINGFIELD RIFLES

- "Days of the Springfield" by Townsend Whelen, 15th ed., 1961.
- "The 1903 Springfield" by Al Miller, 29th ed., 1975.
- "The Springfield 1903 Rifles: Excerpts" by Lt. Col. Wm. S. Brophy, USAR, Ret., 40th ed., 1986.

WINCHESTER RIFLES

- "Exploded Drawings: Winchester Model 70", 17th ed., 1963.
- "I Choose A Rifle" by Paul Matthews, 10th ed., 1956. (About a Win. M70 carbine.)
- "Model 70 Winchester" by Bob Hagel, 19th ed., 1965.
- "My First Model 70" by Mike Thomas, 50th ed., 1996.
- "The Model 70 Winchester 1936-1963" by Kam Nasser, 28th ed., 1974.
- "The Practical Light Sporter" by James R. Olt, 30th ed., 1976. (About the Winchester Model 70 Featherweight.)
- "Tuning the M70 Winchester" by Bob Waller, 19th ed., 1965.
- "Winchester's Model 70 XTR" by Frank Marshall Jr., 35th ed., 1981.

Index

- Ackley M98 Mauser actions, 309, 310
 Anschütz 1432D Custom rifle, 161
 Anschütz Classic M1432D rifle and action, 161-165
 Anschütz Classic, Custom 1532D rifle, 161
 Anschütz M110 Savage rifle, 413
 Argentine M91 Mauser rifles and actions, 129-135
 Arisaka, Japanese rifles and actions, 41, 59-76
 Barrel shank drawings, 501-510
 Brevex Magnum Mauser, 506
 British P14 Enfield, 506
 Champlin, 510
 Danish Krag, 505
 FN Benchrest, 506
 French Berthier 8mm Lebel, 503
 French MAS M1936, 503
 German M98/40, 504
 Greek Mannlicher-Schoenauer, 504
 Hertel's (BSA) U9, 508
 Husqvarna M8000, 507
 Husqvarna, 506
 Italian Carcano, 503
 Italian Youth rifle, 503
 Ithaca LSA-55, 508
 Japanese Type 99, 504
 Japanese Types 38 and 44, 504
 Lee-Enfield, 503
 Mathieu, 509
 Mauser G33/40, 502
 Mauser M71/84, 501
 Mauser M88 Commission, 501
 Mauser M89 Belgian, 501
 Mauser M91 Argentine, 501
 Mauser M93, 502
 Mauser M94, 502
 Mauser M95, 502
 Mauser M96, 502
 Mauser M98 large ring, 502
 Mauser M98 Yugoslav M24, 502
 Norwegian Krag, 505
 Ranger Arms Texas Magnum, 510
 Remington M30, 506
 Remington M30S, 506
 Remington M720, 506
 Remington M721, 509
 Remington M722, 509
 Remington M725, 509
 Ruger M77, 510
 Russian Mosin-Nagant, 504
 Sako L46, 507
 Sako L57, 507
 Sako L61, 508
 Sako L579, 507
 Savage M110, 509
 Savage M110C, 509
 Siamese Mauser, 502
 Spanish M1921 Destroyer, 505
 Tradewinds M600 (Krico M600), 507
 U.S. Krag Jorgensen, 505
 U.S. M1917 Enfield, 506
 U.S. Springfield M1903, 505
 U.S. Springfield M1903A3, 505
 U.S. Springfield M1904A4, 505
 Weatherby Mark V Magnum, 510
 Weatherby Mark V Varmintmaster, 510
 Winchester M54, 508
 Winchester M54, 508
 Winchester M70 22 Hornet, 508
 Winchester M70 (pre-'64), 508
 Belgian M89 Mauser rifle and action, 129, 130, 133, 135
 Benchrest, FN Mauser single shot actions, 230, 233, 234
 Benchrest, M722 conversion to, 350, 351
 Benchrest, Sako single shot actions, 388
 Berthier, French rifles and action, 21-24
 Blank, John, custom rifle and action, 166-168
 Blaser Model R84 rifle, 169-173
 Brazilian M94 rifle, 121
 Brevex Magnum Mauser action, 300, 310-311
 British Lee Magazine System, 77
 British Lee-Enfield Mark VI rifle, 88
 British Lee-Enfield No. 1, Mark III rifle and action, 86
 British Lee-Enfield No. 1 Mark III* rifle, 90
 British Lee-Enfield No. 4 Mark 1/2 rifle, 90
 British Lee-Enfield No. 4 Mark 1/3 rifle, 90
 British Lee-Enfield No. 4 Mark I rifle and action, 88, 89
 British Lee-Enfield No. 4 Mark I* rifle, 90
 British Lee-Enfield No. 5 carbine and action, 86
 British Lee-Enfield rifles and actions, 41, 200
 British Lee-Metford Magazine Rifle Mark I rifle, 86
 British P14 Enfield rifle and action, 200
 Brno (Czech) Sporting rifles, 174-181
 Brno CZ 537 sporter rifle, 181
 Brno CZ 550 rifle, 181
 Brno VZ 24 rifle, 174
 Brno ZG 47 rifle action, 174
 Brno ZKB 527 Fox rifle, 181

Bmo ZKK 600 series rifles, 174
 Bmo ZKK 601 rifle, 175
 Bmo ZKK 602 rifle, 175
 Bmo ZKK rifles and actions, 174-181
 Bmo ZKM 465 rifle, 174
 Browning A-Bolt II BOSS rifle, 182-187
 Browning A-Bolt II Hunter rifle, 182, 185
 Browning A-Bolt II Medallion rifle, 186
 Browning A-Bolt II Stalker rifle, 186
 Browning A-Bolt II Varmint rifle, 186
 Browning BBR Lightning rifle, 193
 Browning BBR rifle and action, 188-193
 Browning FN Mauser action, 236
 Browning Safari Magnum rifle, 232
 BSA CF2 Heavy Barrel Varmint rifle, 203
 BSA CF2 Stutzen rifle, 203
 BSA European CF2 Sporter rifle, 203
 BSA long action, 195
 BSA Majestic rifle and actions, 194-206, 199
 BSA medium action, 194
 BSA Model CF2 rifles and action, 203
 BSA Monarch rifle and actions, 194-206, 200
 BSA No. 15 Target rifle, 213
 BSA North American CF2 Sporter rifle, 202
 BSA Royal rifle and actions, 194-206, 195
 BSA short action, 194
 BSA, Herter's U9 rifle and actions, 194-206, 201-202, 203

Carcano, Italian rifles and actions, 53-58

Cartridges

5.5 Velo Dog, 220
 6.5/257 Roberts, 69
 7.5mm French M1929C, 26
 7.5x54mm French MAS, 26
 7x54mm, 237, 238, 239
 7x57 Mauser, 124-126, 127
 8.15x46R, 235, 236
 11x59R French Gras, 18
 17 CCM, 220
 22 Baby Niedner, 82
 22 CCM, 220
 22 Niedner Magnum, 82
 22 R-2 Lovell, 82
 444 Marlin, 82
 Argentine 7.65mm Mauser, 133
 British 303 Improved, 93
 Danish 8mm (8x58R), 85
 French 7.5mm MAS, 26
 German 7.9x57, 35
 German 7.9x57IS, 109
 German 8x57I Mauser, 109
 German 8x57IS Mauser, 109
 German 8x57s Mauser, 109
 German 11.15x60R Mauser, 116
 German 11mm (43) Mauser, 116
 Greek 6.5mm Mannlicher-Schoenauer, 52
 Italian 6.5mm Carcano, 53, 58
 Italian 7.35mm Carcano, 53, 58

Japanese 6.5mm, 59, 68, 69
 Japanese 7.7mm, 59, 69
 Russian 7.62mm, 146
 Sharpe & Hart 7x61, 428, 433
 Siamese 8mm Mauser, 138
 Swedish 6.5x55mm Mauser, 83, 84, 127
 U.S. 30-03 Springfield, 147
 U.S. 30-40 Krag, 77, 82, 83
 Centurion M98 Mauser rifle and action, 305
 Champlin rifle and action, 207-211
 Chilean M95 Mauser rifle and action, 120, 121
 Colt Coltsman rifle, 391
 Colt Sauer Grand African rifle, 212
 Colt Sauer rifle and action, 212-219
 Colt Sauer short action rifle, 212
 Colt Sauer Sporting rifle, 212
 Cooper M21 action, 221, 222
 Cooper M36 action, 221, 222
 Cooper M38 action, 222
 Cooper M38 Centerfire rifle, 220-224
 Czech Bmo sporting rifles, 174-181
 Czech M24 (VZ-24) Mauser rifle, 174
 Czech M33/40 rifle, 103

Dakota Arms M76 rifles and actions, 225-229

Dakota M76 African Grade rifle, 228
 Dakota M76 Classic Grade rifle, 229
 Dakota M76 Safari Grade rifle, 229
 Dakota M76V Varmint rifle, 228
 Danish Krag action, 84-85
 Danish Krag M89 Infantry carbine, 85
 Danish Krag M89 rifle, 85
 Dutch M95 Infantry rifle, 37

Enfield Pattern 1913 rifle, 16

Enfield, British P14 rifle and action, 9, 16-17
 Enfield, U.S. M1917 rifle and action, 9-15, 41, 200
 Erma 22 conversion unit for M98 Mauser, 97, 98

FN Browning action, 236

FN Deluxe Mauser action, 231, 233
 FN M98 Mauser rifles and actions, 230, 232, 233
 FN Magnum action, 230, 233
 FN Mauser action, 12
 FN Mauser benchrest action, 230, 234
 FN No. 1 action, 233
 FN No. 2 action, 233
 FN No. 3 action, 233
 FN No. 4 action, 233
 FN No. 5 action, 233
 FN No. 6 action, 233
 FN No. 7 action, 234
 FN rifles and actions, 230-236
 FN Series 300 action, 231, 233
 FN Stoeger's Mauser action, 230
 FN Supreme Mauser action, 106, 231, 233
 French Berthier rifle and action, 21-24, 77
 French Kropatschek rifle and action, 18

- French Lebel rifles and actions, 18-21
 French M1874 Gras rifle and action, 18
 French M1934 MAS rifle, 26
 French M1936 MAS rifle and action, 26-31
 French M1936 MAS Sporter rifle, 237-239
 French MAS 1932 rifle, 26
 French MAS 1936 CR39 rifle, 27
 French MAS rifles, 26-31
 French military turnbolls, 18-31
 French M1866 Chassepot rifle, 18, 110
 French M1878 Gras-Kropatschek rifle, 18
 French M1886 Lebel rifle, 18
 French M1886/93 Lebel rifle, 18
 French M1886/93 R35 carbine, 20
 French M1890 Berthier rifle, 25
 French M1907/15 rifle, 26
 French M1916 Berthier rifle, 24
- Geco, Mauser two-shot shotgun, 296-299
 Geha, Mauser two-shot shotgun, 296-299
 German M88 Commission rifle and action, 32-38, 39, 44, 77, 112
 German M98 Mauser rifles and actions, 10, 97, 98, 100-109
 German M98/40 rifle and action, 38, 39-43
 Golden Eagle M7000 rifle and action, 240-243
 Gras, French rifle and action, 18
 Gras-Kropatschek rifle and action, 18
 Greek M1903 Männlicher-Schoenauer rifle and action, 37, 44-52
 Greek M1903/14 rifle, 44
 Greek Männlicher-Schoenauer action, 39, 40, 45
 Greener GP shotgun, 213
 Gustaf, Carl 3000 rifle, 219
- Harrington & Richardson Model 317 Ultra, 391, 395
 Herter's J9 Mauser actions, 308, 309
 Herter's Plinker (22 Hornet) rifle, 244-245
 Herter's U9 rifle and actions, 201-202, 203
 Herter's XK3 Mauser action, 308, 309
 Herter's Mark XK3 action, 308
 Herter's SSK 3042 action, 202
 Herter's SSK 3043 action, 202
 Herter's SSK 3055 action, 202
 Herter's SSK 3056 action, 202
 Herter's SSK 3057 action, 202
 Herter's SSM1 No. 1 action, 308
 Herter's SSM2 No. 2 action, 308
 Herter's SSM3 No. 3 action, 308
 Hungarian G98/40 rifle, 38
 Hungarian M1935 rifle, 39
 Husqvarna M8000 rifle and action, 252-255
 Husqvarna M501 action, 248
 Husqvarna M502 action, 248
 Husqvarna M503 action, 248
 Husqvarna M8000 Imperial rifle, 252
 Husqvarna M9000 rifle, 255
 Husqvarna rifles and actions, 246-251
- Interarms Mini-Mark X rifle and action, 261-266
 Interarms, Mark X Mauser action, 256-260
- Italian Carcano M38 short rifle and carbine, 53
 Italian Carcano M91 rifle & carbine, 53
 Italian Carcano M1891 TS carbine, 53
 Italian Carcano rifles and actions, 53-58
 Italian Model 41 rifle, 53
 Italian Youth carbine, 58
 Ithaca Model LSA-55 Deluxe rifle, 267
 Ithaca Model LSA-55 Heavy Barrel rifle, 267
 Ithaca Model LSA-55 rifle and action, 267-271
 Ithaca Model LSA-55 Standard Grade rifle, 267
 Ithaca Model LSA-65 Deluxe rifle, 267
 Ithaca Model LSA-65 Standard Grade rifle, 267
- J.C. Higgins Model 52 rifle, 391
 Japanese Arisaka rifles and actions, 41, 59-76
 Japanese Arisaka Type 0 Paratroop rifle, 63
 Japanese Arisaka Type 2 (1942) rifle, 61, 63, 67
 Japanese Arisaka Type 30 rifle, 59
 Japanese Arisaka Type 35 rifle, 59
 Japanese Arisaka Type 38 6.5mm training rifle, 61
 Japanese Arisaka Type 38 (1905) carbine, 59
 Japanese Arisaka Type 38 (1905) short rifle, 59
 Japanese Arisaka Type 38 (1905) rifle, 59
 Japanese Arisaka Type 38 rifle and action, 59
 Japanese Arisaka Type 44 (1911) cavalry carbine, 59
 Japanese Arisaka Type 44 rifle, 59
 Japanese Arisaka Type 97 (1937) sniper rifle, 59
 Japanese Arisaka Type 99 (1939) long rifle, 63
 Japanese Arisaka Type 99 (1939) short rifle, 63
 Japanese Arisaka Type 99 (1939) sniper rifle, 63
 Japanese Arisaka Type 99 (1939) rifle, 61
 Japanese Arisaka Type 99 (1944, 1945) rifle, 64
 Japanese Arisaka Type 99 (late version) short rifle, 63
 Japanese Arisaka Type 99 rifle and action, 60, 61, 63, 64, 65, 66, 67, 68, 69, 70
 Japanese Arisaka Type 99 sniper rifle, 63
 Japanese Hook Safety rifle, 74-76
 Japanese military training rifles and actions, 73
 Japanese Type 13 (1880 Murata) rifle, 59
 Japanese Type "I" (Italian made) rifle, 66, 72-73
- Kimber M82 Cascade rifle, 273, 276
 Kimber M82 Classic rifle, 273, 276
 Kimber M82B rifle, 274, 275
 Kimber M82C rifle, 277
 Kimber M82 Hornet rifle and action, 272-279
 Kimber M82 Special Grade rifle, 272, 273
 Kimber M84 rifle and action, 280-281
 Kleinguenther Improved K15 Insta-Fire rifle and action, 282-286
 Krag, Danish rifle and action, 84-85
 Krag, Norwegian rifle and action, 83, 84
 Krag-Jorgensen rifles and actions, 77-85
 Krico Model 300 Hornet rifle and action, 287-291
 Krico Model 400 rifle, 244
 Kropatschek, French rifle and action, 18
- Lebel, French rifles and action, 18-21
 Lee-Enfield rifles, 86-96

Low-numbered M1903 Springfields, 152, 153

Magazine/Guard screw sizes and threads, 511

Mannlicher M92, 37

Mannlicher M93, 37

Mannlicher-Schoenauer sporting rifles, 444

Mannlicher-Schoenauer, Greek M1903 rifles and actions, 44-52

Mark X Alaskan Magnum rifle, 257

Mark X Cavalier rifle, 257

Mark X Continental Mannlicher rifle, 257

Mark X Marquis rifle, 257

Mark X Standard rifle, 257

Mark X Viscount rifle, 257

Mark X Whitworth rifle, 256, 257, 258

Martini single-shot action, 213

MAS, French M1936 rifle and action, 26-31

Mathieu left-hand rifle and action, 292-295

Mausier 8mm, 109

Mausier M67/69 rifle, 110

Mausier M71 carbine, 111

Mausier M71 rifle and action, 32, 100, 110-116

Mausier M71/84 rifle and action, 32, 39, 110-116

Mausier M88, 129-135

Mausier M88 experimental rifle, 129

Mausier M88 rifle, 100

Mausier M89, 129-135

Mausier M89 Belgian rifle, 53, 77, 129

Mausier M90, 129-135

Mausier M90 Turkish rifle, 129

Mausier M91, 129-135

Mausier M91 Argentine rifle and action, 129

Mausier M91 Spanish rifle and action, 129, 130

Mausier M92, 117-128

Mausier M92 Spanish rifle and action, 117

Mausier M93, 61, 117-128

Mausier M93 Spanish rifles and actions, 117-119, 120, 121

Mausier M93 rifle, 41, 100

Mausier M94, 61, 117-128

Mausier M94 Swedish rifles and action, 121-122, 123, 124, 128

Mausier M95, 61, 117-128

Mausier M95 Chilean rifle and action, 120, 121

Mausier M95 Spanish rifles and actions, 117-119, 120, 121

Mausier M96, 61, 117-128

Mausier M96 Swedish rifles and actions, 121-122, 123, 124, 128

Mausier M98 breech cover, 98-99

Mausier M98 rifles and actions, 97, 98, 100-109

Mausier M98 short actions, 104, 105

Mausier M98 Sporters, 300-304

Mausier two-shot shotgun, 296-299

Mausier, 8mm Siamese rifle and action, 136-139

Mausier, Ackley M98 action, 309, 310

Mausier, Brexex Magnum action, 300, 310-311

Mausier, Centurion M98 action, 305

Mausier, commercial sporting rifles, 300-304

Mausier, Herter's J9 actions, 308, 309

Mausier, Mark X action, 256-260

Mausier, miscellaneous commercial actions, 305-311

Mausier, Santa Barbara action, 306-307

Mausier, Spanish M93, 117

Mosin-Nagant, Russian rifles and actions, 19, 140-146

Mossberg M800 carbine, 316

Mossberg M800 Deluxe Sporter, 316

Mossberg M800 rifle and action, 312-316

Mossberg M800 Varmint-Target, 316

Mossberg M810 rifle, 316

Mossberg M1500, 438

Mossberg Model RM7 rifle, 316

National Match, Springfield sporter and target actions, 150, 151

Newton, Charles, original turnbolt rifle and action, 317-322

Norwegian, Krag rifle and action, 83, 84

NRA, Springfield sporter, 151, 152

Omega III rifle and action, 323-327

Page-Lewis Model D rifle, 244

Parker-Hale M1200 rifle, 307

Pattern 14 Enfield rifle and action, 200

Plinkor, Herter's 22 Hornet rifle and action, 244-245

Ranger Arms, Texas Magnum rifle and action, 450-453

Remington M30 Express carbine, 342

Remington M30 rifle, 17, 342-344

Remington M30A Standard rifle, 343

Remington M30R carbine, 343

Remington M30S rifle, 17, 342-344

Remington M30SL rifle, 343

Remington M30SR carbine, 343

Remington M30SX carbine, 343

Remington M40-X rifles, 345-357

Remington M40-XB Rangemaster Target rifle, 357

Remington M40-XBRR Benchrest Match rifle, 357

Remington M40-XC National Match Course rifle, 357

Remington M600 carbine, 334, 345-357

Remington M600 Magnum carbine, 352

Remington M600 Mohawk rifle, 352

Remington M600 Standard carbine, 352

Remington M660 Magnum rifle, 352

Remington M660 rifle and action, 334, 345-357

Remington M700 ADL rifle, 354, 356

Remington M700 African Plains rifle, 356

Remington M700 Alaskan Wilderness rifle, 356

Remington M700 BDL Left-Hand rifle, 354

Remington M700 BDL rifle, 356

Remington M700 BDLSS rifle, 356

Remington M700 Classic rifle, 354, 356

Remington M700 Custom rifle, 355, 356

Remington M700 Mountain rifle, 339-341

Remington M700 rifle and action, 345-357

Remington M700 Safari rifle, 355, 356

Remington M700 Varmint rifle, 355, 356

Remington M700 Varmint Synthetic rifle, 356

Remington M700 Varmint Synthetic Stainless rifle, 355

Remington M720 rifle, 13, 17, 342-344

- Remington M720A rifle, 344
- Remington M720R carbine, 344
- Remington M720S rifle, 344
- Remington M721 Deluxe rifle, 348
- Remington M721 rifles and actions, 334, 345-357
- Remington M722 benchrest action, 350
- Remington M722 rifles and actions, 345-357
- Remington M725 rifle and action, 345-357
- Remington M788 rifle and action, 328-333
- Remington Model Seven carbine and action, 334-338, 339
- Remington Model Seven Custom KS rifle, 339
- Remington Model Seven Custom MS rifle, 339
- Remington Model Seven SS rifle, 339
- Remington Model Seven Youth rifle, 339
- Remington XP-100 pistol, 356
- Remington-Lee sporting rifles, 86
- Remo Mauser two-shot shotgun, 298
- Ruger M77 Express, 358
- Ruger M77 International, 358, 363
- Ruger M77 Mark II All-Weather rifle, 367, 369
- Ruger M77 Mark II Express rifle, 367
- Ruger M77 Mark II International carbine, 367
- Ruger M77 Mark II Left-Hand rifle, 370
- Ruger M77 Mark II Magnum rifle, 367, 371
- Ruger M77 Mark II rifle and action, 367-374
- Ruger M77 Mark II Ultra Light rifle, 367
- Ruger M77 Sporter, 366
- Ruger M77 Ultra Light, 358, 363
- Ruger M77/22 Hornet rifle and action, 375-380
- Ruger M77M Magnum, 358, 366
- Ruger M77RS Mark II rifle, 367
- Ruger M77V Varminter, 358, 366
- Ruger M77VT Mark II Target rifle, 367
- Ruger Original M77 rifle and action, 358-366, 375
- Rumanian M92 rifles, 37
- Rumanian M93 rifles, 37
- Russian Mosin-Nagant 91/38 rifle, 140
- Russian Mosin-Nagant 91 rifles, 140
- Russian Mosin-Nagant 91/30 rifles, 140
- Russian Mosin-Nagant 91/30 sniper rifles, 140
- Russian Mosin-Nagant M1891 rifles and actions, 19
- Russian Mosin-Nagant M1910 carbines, 141
- Russian Mosin-Nagant M1938 carbine, 141
- Russian Mosin-Nagant M1944 carbine, 141
- Sako A1 actions, 381, 388
- Sako A2 actions, 381, 388
- Sako A3 actions, 381, 388
- Sako benchrest single shot rifle and action, 381, 388
- Sako Classic rifles, 381, 390
- Sako Deluxe Lightweight rifles, 381, 390, 393
- Sako Fiberclass rifle, 381, 390
- Sako High Power rifle, 395
- Sako Hunter Lightweight rifles, 381
- Sako Hunter Model, 390, 393
- Sako L42 rifle, 394
- Sako L46 rifle, 381, 392, 393, 394
- Sako L46 Vixen action, 381
- Sako L57 Forester action, 381, 385, 386
- Sako L57 rifle, 392, 393, 395
- Sako L61 Finnbear action, 381, 386, 387, 388, 394
- Sako L61R Finnbear rifle, 381, 395
- Sako L461 rifle, 381, 386, 394, 395
- Sako L461 Vixen action, 388
- Sako L469 action, 388, 395
- Sako L579 Forester action, 381, 386, 387, 394, 395
- Sako Laminated Model rifle, 390, 393
- Sako Mannlicher-Style carbine, 381, 390
- Sako Model 72 rifle, 395
- Sako Model 322 rifle, 391
- Sako PPC USA BR/Varmint rifle, 381, 390
- Sako Presentation L61R rifle, 395
- Sako rifles and actions, 381-395
- Sako Safari Grade rifle, 381, 390
- Sako Super Deluxe rifle, 381, 390
- Sako TRG-21 rifle, 381, 390
- Sako TRG-S rifle, 381, 390, 395
- Sako Varmint Heavy Barrel rifle, 381
- Sako Whitetail/Batue rifle, 395
- Santa Barbara M98 Mauser action, 306-307
- Sauer (Colt) rifle and action, 212-219
- Savage M19H rifle, 403
- Savage M23 rifle and action, 402-408
- Savage M23 Sporter rifle, 402
- Savage M23A Sporter rifle, 402
- Savage M23B rifles, 402-408
- Savage M23C rifle, 402-408
- Savage M23D rifles, 245, 402-408
- Savage M40 Sporter, 409-412
- Savage M45 Super Sporter rifles, 409-412
- Savage M110 Series rifles and actions, 413-423
- Savage M110C rifle, 413, 414
- Savage M110CL rifle, 420
- Savage M110E rifle, 420
- Savage M110ES rifle, 420
- Savage M110S rifle, 420
- Savage M111 rifle, 420
- Savage M111F Classic Hunter rifle, 422
- Savage M111FCXP3 Package rifle, 422
- Savage M111G Classic Hunter rifle, 422
- Savage M112 BT Competition Target rifle, 422
- Savage M112 Varmint rifle, 420
- Savage M112FVSS Varmint rifle, 423
- Savage M114CU Classic Ultra rifle, 423
- Savage M116FSS Standard Weather Warrior rifle, 423
- Savage M116SE Safari Express rifle, 423
- Savage M340 rifles, 424-427
- Savage M342 rifle, 424
- Savage M1919 NRA Target rifle, 402
- Savage M1920 rifle and action, 396-401
- Savage M1920-1926 rifle, 396
- Savage-Stevens M340 rifle and action, 424-427
- Schultz & Larsen M54J rifle, 428, 429
- Schultz & Larsen M56A Super Magnum rifle and action, 431
- Schultz & Larsen M60 rifle, 429
- Schultz & Larsen M65 rifle, 429, 430

Schultz & Larsen M68DL rifle, 430, 431
 Schultz & Larsen rifles, 428-433
 Smith & Wesson and Mossberg M1500 rifles, 434-439
 Smith & Wesson M1500 Mountaineer rifle, 437
 Smith & Wesson M1500 rifle and action, 434-437
 Smith & Wesson M1700 rifle, 437
 Smith & Wesson M1700LS Classic Hunter rifle, 437
 Smith & Wesson rifle and action, 249-251
 Smith & Wesson rifles made by Husqvarna, 246-251
 Spanish M91 Mauser rifle and action, 129, 130, 132, 133, 135
 Spanish M92 Mauser rifle, 117
 Spanish M93 Mauser rifles and actions, 117-120, 121, 123, 128
 Spanish M93 short rifle, 121
 Sportco Angel Model 80 Target rifle, 443
 Sportco M44 Target rifle and action, 440-443
 Springfield M1903 rifles and actions, 9, 16, 147-158
 Springfield M1903A1 rifle, 152
 Springfield M1903A2, 154
 Springfield M1903A3 rifles and actions, 147-158
 Springfield M1903A4 rifle, 147-158
 Springfield, low numbered, 152
 Springfield, National Match sporter and target actions, 150, 151
 Springfield, NRA sporter, 151, 152
 Stevens M322 rifles, 424, 425
 Stevens M325 rifles, 424, 425
 Steyr-Mannlicher Model SL rifle and action, 444-449
 Stoeger Peerless action, 230
 Sturm, Ruger & Co., M77 rifle and action, 358-366
 Swedish Husqvarna actions, 246-251
 Swedish M38 Mauser short rifle, 122
 Swedish M41 Mauser sniper rifle, 122
 Swedish M94 Mauser carbine and action, 249
 Swedish M96 Mauser rifle, 100, 249
 Swedish Mauser rifles and actions, 121-128
 Swiss Rubin rifle, 77

Texas Magnum Maverick action, 450
 Texas Magnum Maverick single shot action, 450
 Texas Magnum rifles and actions, 450-453
 Texas Magnum single shot action, 451, 452, 453
 Thai Model 45/46 rifles, 136
 Tradewinds Brevex Mauser actions, 310-311
 Tradewinds Husky rifle, 458
 Tradewinds Husqvarna actions, 246-251
 Tradewinds Husqvarna M8000 rifle and action, 252-255
 Tradewinds M600DS rifle, 454
 Tradewinds M600K rifle, 454
 Tradewinds M600S rifle, 454
 Tradewinds M6128 action, 454
 Tradewinds M6357 action, 454
 Tradewinds Series 600 rifles and actions, 454-458
 Turkish M90 Mauser rifle, 129, 130, 133, 135
 Turkish M93 Mauser rifle, 121

U.S. Krag M1892 rifle, 77
 U.S. Krag M1896 carbine, 77
 U.S. Krag M1898 rifle and carbine, 77
 U.S. Krag M1899 carbine, 77

U.S. Krag-Jorgensen rifles and action, 77-83
 U.S. M1903 Springfield rifles and actions, 147-158
 U.S. M1903A3 Springfield rifle and action, 147-158
 U.S. M1917 Enfield rifle and action, 9-15, 41, 200
 U.S. Springfield M1903 Mark I, 150

Weatherby Mark V Magnum rifle and action, 459-464
 Weatherby Mark V Varmintmaster action, 464
 Weatherby Vanguard rifle and action, 465-469
 Weatherby Vanguard Weatherguard rifle, 465
 Winchester M43 rifle and action, 245, 470-474
 Winchester M43 Special Sporter, 470
 Winchester M43 Standard Sporter, 470
 Winchester M54 National Match Model, 487
 Winchester M54 rifle and action, 470, 487-497
 Winchester M54 Sniper's Model, 487
 Winchester M54 Target Model, 487
 Winchester M70 (1968) rifle and action, 481
 Winchester M70 African rifle, 491
 Winchester M70 Alaskan rifle, 491
 Winchester M70 Bull Gun, 491
 Winchester M70 Classic Featherweight, 479
 Winchester M70 Classic rifle and action, 475-479
 Winchester M70 Classic Super Express rifle, 479
 Winchester M70 Classic Super Grade rifle, 479
 Winchester M70 Featherweight rifle, 491, 492, 493
 Winchester M70 Model B Single Shot rifle, 494, 495, 496
 Winchester M70 National Match rifle, 491
 Winchester M70 post-'64 African rifle, 480
 Winchester M70 post-'64 Magnum rifle, 480
 Winchester M70 post-'64 Standard rifle, 480
 Winchester M70 post-'64 Target rifle, 480
 Winchester M70 post-'64 Varmint rifle, 480
 Winchester M70 pre-'64 rifles and action, 491-497
 Winchester M70 Sniper's Match rifle, 491
 Winchester M70 Sporter DBM rifle, 486
 Winchester M70 Stainless rifle, 486
 Winchester M70 Standard rifle and carbine, 491
 Winchester M70 Super Grade rifles, 491
 Winchester M70 Target rifle, 491
 Winchester M70 Varmint rifle, 491
 Winchester M70 Westerner rifle, 486, 491
 Winchester M70 XTR Featherweight rifle, 486
 Winchester M70 XTR Magnum Sporter rifle, 486
 Winchester M70 XTR Sporter rifle, 484
 Winchester M70 XTR Super Express Magnum rifle, 486
 Winchester M70 XTR Varmint Sporter rifle, 486
 Winchester M670 rifle and action, 483, 484
 Winchester M770 rifle and action, 483, 484
 Winchester M1885 rifle, 82
 Winchester New M70 rifle and action, 480

XXK3 Herter's Mauser action, 308, 309

Yugoslavian M24 Mauser action, 105

ZG 47 Brno rifle and action, 174
 ZKK Brno rifles and actions, 174-181

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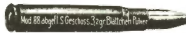
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